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Original Articles.

CLINICAL STUDIES IN MALARIA BY CULTURAL AND ENUMERATIVE METHODS.

By R. KNOWLES,
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Professor of Protozoology,
and
ASSISTANT SURGEON B. M. DAS GUPTA,
Assistant Professor of Protozoology, Calcutta School of Tropical Medicine.

IN a previous paper (Knowles and Das Gupta, 1930) we reported that we had commenced to make a clinical study of untreated cases of malaria by cultural and enumerative methods. The series of cases reported in the present paper form a continuation of those reported in our former paper, but also include observations on treatment with quinine, cinchona febrifuge and Plasmoquine. Hence the necessity for a change in the title of the present paper.

We propose first to detail the fifteen cases studied, with comments on each; then to discuss the points of importance that have so far emerged from these studies.* The cultures were all taken by the modification of Bass' method advocated by J. G. and D. Thomson (1913, 1913*a*), and the parasite counts were carried out by the enumerative method of Sinton (1924). In every instance 5 c.c. of blood was taken for each culture. In carrying out the counts, the number of parasites corresponding to 250 nucleated fowl's erythrocytes was recorded.

Case 1.—Hindu female child, aged 7. History of fever with sweats and rigors for 3 months. Spleen enlarged to 2 finger-breadths. Thin and thick films and a Bass culture showed *P. vivax* infection (only) present.

Date.	Temperature.	Parasites per c.mm.	Forms present.
1-8-29	101.2°F.	950	Growing trophozoites.
2-8-29	100°F.	1,000	Rings and trophozoites.
3-8-29	99.8°F.	628	Trophozoites and schizonts.
5-8-29	100°F.	325	Trophozoites.
6-8-29	99.5°F.	556	Trophozoites and schizonts.
7-8-29	99.9°F.	1,350	Rings and trophozoites.
8-8-29	99.8°F.	2,200	Trophozoites and gametocytes.
9-8-29	99°F.	2,300	Do.
10-8-29	100°F.	1,040	Trophozoites.
12-8-29	103.2°F.	1,600	Trophozoites and schizonts.

As there appeared to be no tendency towards spontaneous cure, the child was now put on to alkalies and quinine, and was soon cured.

Comments.—The case illustrates well the tendency in benign tertian malaria towards chronic residual infections, associated with febrile relapses. During the 12 days that the patient was left untreated there was no evidence of any tendency towards spontaneous cure.

Case 2.—Mahommedan male, aged 28, admitted for kala-azar, with *L. donovani* present in spleen puncture films. Aldehyde reaction +++. Received two courses of Neostibosan, and was cured. Temperature normal from 22nd July, 1929, but commenced to rise again on 31st July, 1929. On 3rd August, 1929, the temperature rose to 103.7°F. with a rigor. Thin and thick films and a Bass culture showed *P. vivax* (only) present.

Date.	Temperature.	Parasites per c.mm.	Forms present.
6-8-29	99°F.	7,000	Trophozoites and gametocytes.
7-8-29	99.4°F.	24,848	Chiefly schizonts.
8-8-29	98°F.	21,750	Trophozoites and gametocytes.
9-8-29.	97.4°F.	18,780	Chiefly schizonts, with trophozoites and gametocytes.

The patient was now so seriously ill, that, although the temperatures were not high, alkalies and quinine had to be administered.

Comments.—This case appears to have been a relapse. There is very little indigenous malaria in the heart of Calcutta city, and it does not appear likely that the patient contracted malaria whilst in hospital. The very high parasite counts associated with a relapse, in spite of the fact that the temperature in general was not high, are noteworthy.

Case 3.—Deonandan, Hindu male, aged 22, durwan in the Pathology Department, Calcutta School of Tropical Medicine. History of fever a year previously, which lasted for one week. Fever again on 1st September, 1930. Spleen and liver not palpable. Admitted 3rd September, 1930. Thin and thick films and Bass culture show *P. vivax* (only).

Date.	Temperature.	Parasites per c.mm.	Forms present.
3-9-30	Normal	320	Growing trophozoites.
4-9-30	Do.	40	Rings.
5-9-30	Do.	0	
6-9-30	Do.	0	
8-9-30	Do.	0	
9-9-30	Do.	0	
10-9-30	Do.	0	
11-9-30	Do.	0	
13-9-30	Do.	0	
17-9-30	100°F.	40	Growing trophozoites.
18-9-30	102.4°F.	360	Do.

Now put on to cinchona febrifuge, gr. x. b.d., with Plasmoquine, 0.01 gm. once daily, for ten days.

19-9-30	Normal	40	Trophozoites.
20-9-30	Do.	0	
22-9-30	Do.	0	
28-9-30	Completed treatment.		Treatment discontinued.
9-10-30	Bass culture sterile.		

* Six of these cases have previously been published in Knowles and Senior White's "Studies in the Parasitology of Malaria" (1930. *Indian Medical Research Memoir*, No. 18); but in order to make the series as complete as possible, and as few readers of the *Indian Medical Gazette* read the *Indian Medical Research Memoirs*, they are included here.

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Comments.—The case was clearly one of low grade, residual relapsing benign tertian infection. It proved very amenable to treatment with cinchona febrifuge and Plasmoquine.

Case 4.—Hindu male, aged 24, a film actor, was admitted with secondary syphilis. Wassermann reaction +++. Skin lesions on both thighs and penis. Bass culture for malaria parasites on admission negative. It was decided to test the effect of induced malaria in secondary syphilis.

21st June, 1930. A patient suffering from a low grade malignant tertian infection presented himself in the out-patient department. He was used as the donor. The donor's blood showed 120 parasites per c.mm. (rings only), and Bass cultures showed *P. falciparum* (only). Blood was withdrawn from this donor and 1 c.c. given to the patient with syphilis, the injection being given partly intramuscularly and partly subcutaneously.

The recipient first showed fever on the 4th July, 1930, the incubation period being 13 days.

Date.	Temperature.	Parasites per c.mm.	Forms present.
4-7-30	102.8°F.	400	Rings and schizont rings.
5-7-30	98.6°F.	1,420	Rings.
7-7-30	97°F.	480	Do.
8-7-30	103°F.	7,160	Rings and schizont rings.
9-7-30	100.2°F.	2,360	Rings.
10-7-30	104°F.	9,360	Rings and schizont rings.
11-7-30	104°F.	200	Rings.
12-7-30	101.2°F.	280	Do.
14-7-30	99.8°F.	3,040	Rings and schizont rings.
15-7-30	98.6°F.	780	Rings.
16-7-30	98.6°F.	1,600	Rings, schizont rings and crescents.
17-7-30	101°F.	0	
18-7-30	98.6°F.	1,520	Rings and crescents.
19-7-30	98°F.	240	Do.
21-7-30	98.6°F.	0	
22-7-30	98.6°F.	0	
23-7-30	102°F.	160	Rings and crescents.

The patient was now put on to cinchona febrifuge in tablet form, gr. x. b.d., plus Plasmoquine, 0.02 gramme b.d.

24-7-30	103°F.	120	Rings only.
25-7-30	100.4°F.	40	Do.

The blood was thereafter free from parasites, and the patient made a rapid recovery from his malaria. The cinchona febrifuge and Plasmoquine were discontinued on the 3rd August, 1930—the eleventh day. A Bass culture was taken on 11th August, 1930—eight days after the cessation of all treatment—and gave negative results, no parasites of any type being encountered in it.

The effect of the induced malaria on the secondary syphilis was nil, and the patient was thereafter treated with neosalvarsan.

Comments.—We confess that it was with some trepidation that we experimentally induced malignant tertian malaria in this patient. We were careful, however, to select as a donor a patient with only a low residual count. As a result the recipient only contracted a mild infection, and was at no time in any danger. It is to be noted that crescents first appeared on the tenth day after the first rise of temperature—a finding which agrees with the generally accepted view of the relationship of crescent production to the duration of the fever.

It will be noted that between 19th July, 1930, and 23rd July, 1930, there was a definite tendency towards spontaneous cure of the infection, nil counts being recorded on three occasions. Had this patient been left for a further time untreated, it appears probable that he would have undergone spontaneous recovery (of his malaria). The ten-day course of cinchona febrifuge, gr. x. b.d., was enough to exterminate the schizogony cycle. The effect of Plasmoquine on the crescents present was immediate and dramatic; no crescents were seen after the first day's Plasmoquine administration.

This case was one of the most interesting in the series, as we were able to keep the patient untreated for 19 days of fever.

Case 5.—Sweeper, male, aged 35. Fever of about one month's duration. On admission thin and thick blood films and a Bass culture showed the presence of *P. falciparum* (only). Spleen and liver not palpable.

Date.	Temperature.	Rings per c.mm.	Crescents per c.mm.
2-9-30	103°F.	6,200	0
3-9-30	100.6°F.	1,640	0
4-9-30	101.2°F.	4,120	0
5-9-30	99.8°F.	4,320	240
6-9-30	99°F.	2,400	40
8-9-30	Normal	120	396
9-9-30	Do.	0	920; a Bass culture however showed scanty asexual forms present.
10-9-30	Do.	0	1,020
11-9-30	Do.	0	920
12-9-30	99.4°F.	0	1,100
13-9-30	99.6°F.	320	1,280
Patient now put on to alkalies and quinine, gr. x. b.d.			
15-9-30	Normal	0	1,640
Plasmoquine 0.01 gramme daily added.			
16-9-30	Normal	0	880
17-9-30	Do.	0	840
18-9-30	Do.	0	420
19-9-30	Do.	0	0
20-9-30	Do.	0	40; i.e., one very much degenerated one only.
22-9-30	Do.	0	0
23-9-30	Do.	0	0
All treatment discontinued.			
6-10-30	Bass culture sterile.		

Comments.—This case also was one of the most interesting in the series. In the thin films before admission growing trophozoites as well as rings of *P. falciparum* were present. The tendency to spontaneous cure between 6th September, 1930, and 12th September, 1930, as well as the change over from the asexual to the sexual cycle is well seen. After the administration of 0.03 gm. of Plasmoquine only one crescent was seen, and that a much degenerated one. A total dosage of 0.06 gm. of Plasmoquine given in six days exterminated all crescents.

In the films on 3rd September, 1930, a few pigment bearing leucocytes were seen, both polymorphonuclear and large hyaline mononuclears.

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In the films of 4th September, 1930, a polymorphonuclear leucocyte and a large mononuclear hyaline leucocyte were each seen containing an ingested schizont rosette of *P. falciparum*. The gametocytes seen in the films of 5th September, 1930, were of young type, rounded and not yet fully crescentic in shape. The films on 8th September, 1930, showed a large number of pigment bearing macrophages.

A ten-day course of treatment with alkalies and quinine gr. x. b.d., supplemented by Plasmoquine 0.01 gramme daily for 7 days, was sufficient in this case to eradicate all infection, as tested by a Bass culture taken 13 days after the cessation of all treatment.

Case 6.—Mahommedan male, aged 32, resident of Calcutta. History of fever off and on for one month. Spleen just palpable, liver normal. Before admission, thin and thick films and a Bass culture showed the presence of *P. falciparum* (only).

Date.	Temperature.	Rings per c.mm.	Crescents per c.mm.
10-9-30	99°F.	2,000	1,360
11-9-30	Normal	840	2,400
12-9-30	99.4°F.	1,620	1,980
13-9-30	Normal	1,240	1,320
15-9-30	Do.	720	1,920
16-9-30	99.2°F.	240	1,200
Now put on to alkalies plus quinine, gr. x. b.d.			
17-9-30	Normal	560	780
18-9-30	Do.	0	920
19-9-30	Do.	0	1,080
Plasmoquine 0.01 gramme daily added.			
20-9-30	Normal	0	600
22-9-30	Do.	0	120
23-9-30	Do.	0	0
24-9-30	Do.	0	0
25-9-30	Do.	0	0
26-9-30	Do.	0	0
All treatment discontinued.			
6-10-30	Bass culture sterile.		

Comments.—The earlier counts before treatment was instituted show a tendency to spontaneous reduction of the asexual cycle, though the crescent output remained at more or less the same level. A total dosage of 0.04 gramme of Plasmoquine, administered in 4 days, was sufficient to exterminate all crescents. The combined treatment by alkalies and quinine gr. x. b.d. for 10 days, with a terminal course of Plasmoquine gm. 0.01 daily for 7 days, eradicated all infection.

Case 7.—Nepali male, aged 26, peon to Dr. Strickland's malaria survey party. Worked in Bengal, 1927-28; health good. In Assam, April—September 1928; then in the Darjeeling, Terai, November 1928—April 1929; suffered from repeated attacks of malaria in both areas. From April—June 1929 constant malaria with rigors. Admitted to hospital 31st July, 1929. Thin and thick films and a Bass culture show *P. falciparum* (only).

Date.	Temperature.	Parasites per c.mm.	Forms present.
1-8-29	98.6°F.	314	Rings only.
3-8-29	98°F.	100	Do.
5-8-29	98.4°F.	0	
6-8-29	98°F.	50	Rings only.
7-8-29	99°F.	40	Do.
8-8-29	99.4°F.	250	Do.
10-8-29	99.4°F.	0	
12-8-29	99°F.	0	
13-8-29	Bass culture sterile.		Discharged.

Comments.—This patient is apparently "salted" to malaria. He received no treatment at all whilst in hospital, yet the residual infection cleared up spontaneously. The nature of his duties are rendering him more or less immune or tolerant to malignant tertian malaria, though at the cost of repeated attacks. Another interesting feature of the case is that no gametocytes were seen at any time, either in blood films or in the two cultures taken.

Case 8.—Nepali male student, aged 14. Fever and rigors for two and a half months. Spleen enlarged to 1½ finger-breadths below costal margin. Thin and thick films and a Bass culture show *P. falciparum* (only).

Date.	Temperature.	Parasites per c.mm.	Forms present.
22-7-29	100°F.	3,667	Rings only.
23-7-29	98°F.	40	Do.
24-7-29	99.9°F.	971	Do.
25-7-29	99.4°F.	500	Do.
27-7-29	96°F.	3,200	Do.

As there was but little evidence of any tendency to spontaneous cure, the patient was now put on to alkalies and quinine, and made a speedy recovery.

Comments.—This patient showed little or no tendency to spontaneous cure. No crescents were seen at any time, either in the films or in the culture taken.

Case 9.—Mahommedan male, aged 25. Came from Barisal for antirabic treatment. History of fever off and on for about two months. Spleen and liver not palpable. Slight icteric tinge of the conjunctivæ. Thin and thick films and a Bass culture showed the presence of *P. falciparum* (only).

Date.	Temperature.	Rings per c.mm.	Crescents per c.mm.
24-9-30	99.2°F.	120	480
Put on to Plasmoquine 0.01 gramme daily. No quinine.			
25-9-30	Normal	0	800
26-9-30	Do.	0	240
27-9-30	Do.	0	80
29-9-30	Do.	0	0
30-9-30	Do.	0	0
Plasmoquine discontinued. No treatment.			
1-10-30	Normal	0	0
2-10-30	Do.	0	0. No crescents seen in two thick films.
3-10-30	Do.	0	0
4-10-30	99.2°F.	0	0
6-10-30	100.2°F.	80	0
Put on to alkalies and quinine, gr. x. b.d.			
7-10-30	Normal	0	0
8-10-30	Do.	0	0
16-10-30	All treatment discontinued.		
18-10-30	Bass culture sterile.		

Comments.—This patient presented a low grade "residual" infection. No crescents at all were seen after the administration of a total dose of 0.04 gramme of Plasmoquine in 4 days. The Plasmoquine administration, however, failed to prevent the relapse which set in on 4th October, 1930. The usual ten-day course of alkalies and quinine finally appeared to have eradicated the infection.

Case 10.—Nepali male, aged 24, from the Darjeeling district, with a history of fever for one month. Marked anæmia. Spleen enlarged to 2 finger-breadths below costal margin. Blood films show *P. falciparum* rings,

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normoblasts, and anisocytosis. Bass culture shows *P. falciparum* (only).

Date.	Temperature.	Parasites per c.mm.	Forms present.
18-7-30	102.4°F.	840	Rings only.
19-7-30	100.4°F.	960	Do.
20-7-30	100.2°F.	1,120	Do.
21-7-30	99.6°F.	640	Do.
22-7-30	98.6°F.	720	Do.
23-7-30	100.6°F.	1,080	Do.
24-7-30	102.8°F.	120	Do.
25-7-30	100.4°F.	0	Scanty rings in thick film.
26-7-30	99.8°F.	0	Do.

Now treated with cinchona febrifuge in tablet form gr. x. b.d. for 10 days, plus Plasmoquine 0.02 gramme b.d. for 10 days.

6-8-30 Rise of temperature to 99.6°F.
7-8-30 Thick films show scanty rings of *P. falciparum* present.

Put on to alkalies and quinine.

Comments.—This patient showed a low grade infection with a definite tendency to spontaneous cure. The ten-day treatment with cinchona febrifuge and Plasmoquine, however, failed to eradicate even this low grade residual infection, though it yielded rapidly to alkalies and quinine. No crescents were seen at any time, either in the films or in the culture.

Case 11.—Mahommedan male adult from Cherrapongee. Fever off and on for two months. On admission, 31st July, 1930, temperature 99°F. Very anæmic. Spleen just palpable. Thin and thick blood films and a Bass culture show *P. falciparum* (only)—rings and crescents.

Date.	Temperature.	Parasites per c.mm.	Forms present.
1-8-30	100.8°F.	920	Rings and crescents.
2-8-30	100.2°F.	760	Rings only.

Now treated for 10 days with cinchona febrifuge tablets gr. x. b.d., plus Plasmoquine 0.02 gramme b.d. Urine tested daily with Mayer's reagent.

3-8-30	99.2°F.	640	Rings only.
4-8-30 to 8-8-30	Normal	0	No parasites seen.

5-8-30 Plasmoquine omitted on account of pain in the epigastric region.
13-8-30 Patient afebrile, but blood films show very scanty rings of *P. falciparum* present. Placed on alkalies plus quinine.

Comments.—The absolute failure of the cinchona febrifuge to eradicate the infection is to be noted. Mayer's reagent showed traces of alkaloids present in the urine on the 5th, 6th, 7th and 12th; but none at all on the 8th, 9th, 10th and 11th. Clearly the cinchona febrifuge was not being absorbed; and the official Government tablet is too hard for absorption. No crescents were seen after Plasmoquine administration was commenced; on the other hand, the Plasmoquine administration had to be discontinued on the third day on account of its causing epigastric pain.

Case 12.—Hindu male, cultivator, aged 30 years, resident of Howrah district. History of fever off and on fc. about a year. Spleen palpable, liver normal. Afebrile on admission. Thin and thick films and a Bass culture show *P. falciparum* (only)—rings and crescents.

Date.	Temperature.	Rings per c.mm.	Crescents per c.mm.
4-9-30	Normal	120	520
Put on to alkalies and quinine, gr. x. b.d.			
5-9-30	Normal	0	1,600
6-9-30	Do.	0	880
8-9-30	Do.	0	920
9-9-30	Do.	0	880
10-9-30	Do.	0	920
11-9-30	Do.	0	820
12-9-30	Do.	0	840
13-9-30	Do.	0	680
Quinine discontinued. No treatment.			
15-9-30	Normal	0	480
Given 0.01 gm. Plasmoquine once daily.			
16-9-30	Normal	0	320
17-9-30	Do.	0	240
18-9-30	Do.	0	40; i.e., one degenerated crescent in film.
19-9-30	Do.	0	40; ditto.
20-9-30	Do.	0	0
21-9-30	Do.	0	0
Plasmoquine discontinued. No treatment.			
22-9-30	Normal	0	0
23-9-30	Bass culture sterile.		

Comments.—This case shows very well how alkalies plus quinine eradicated the schizogony cycle, but actually increased the number of crescents. The latter, however, were rapidly eradicated by Plasmoquine treatment.

Case 13.—Hindu male, aged 31. History of fever and vomiting with remissions for one month. Thin and thick films and a Bass culture show trophozoites and schizonts of *P. vivax*, also gametocytes (only) of *P. falciparum*.

Date.	Temperature.	Parasites per c.mm.	Forms present.
2-5-30	98.4°F.	B.T. 0 Crescents 80	
3-5-30	97.4°F.	B.T. 40 Crescents 60	Trophozoites.
5-5-30	98°F.	B.T. 160 Crescents 40	Do.
6-5-30	98.4°F.	B.T. 40 Crescents 680	Schizonts.
7-5-30	98.4°F.	B.T. 200 Crescents 360	Rings and trophozoites.
8-5-30	103°F.	B.T. 1,540 Crescents 240	Rings, trophozoites and schizonts.
9-5-30	97.2°F.	B.T. 4,840 Crescents 120	All phases.
10-5-30	102.2°F.	B.T. 4,240 Crescents 800	Do.
11-5-30	97.8°F.	B.T. 5,680 Crescents 120	Do.
13-5-30	100.6°F.	B.T. 2,360 Crescents 0	Do.
14-5-30	98°F.	B.T. 1,920 Crescents 120	Do.

Now put on to alkalies and quinine, gr. x. b.d.

Date.	Temperature.	*P. vivax*; parasites per c.mm.	*P. falciparum*; gametocytes per c.mm.
15-5-30	97.6°F.	0	80
16-5-30	98.4°F.	0	160
Bass culture shows scanty *P. vivax* infection still present.			
17-5-30	98.4°F.	0	1,600
19-5-30	97°F.	0	1,360
20-5-30	98.4°F.	0	2,040

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Bass culture shows crescents only.			
21-5-30	98.4°F.	0	3,060
22-5-30	Normal	0	2,040
23-5-30	Do.	0	1,640
Quinine discontinued; given iron and arsenic.			
24-5-30	Normal	0	1,760
26-5-30	Do.	0	980
28-5-30	Do.	0	1,160
29-5-30	Do.	0	880
30-5-30	Do.	0	1,000
31-5-30	Do.	0	760
2-6-30	Do.	0	240
3-6-30	Do.	0	240
4-6-30	Do.	0	600
5-6-30	Do.	0	400
6-6-30	Do.	0	280
7-6-30	Do.	0	320
9-6-30	Do.	0	120
10-6-30	Do.	0	160
11-6-30	Do.	0	120
Now given Plasmoquine; 0.06 gm. daily.			
12-6-30	Normal	0	160, and markedly degenerated.
13-6-30	Do.	0	0, but still present and very scanty in thick film.
14-6-30	Do.	0	0
Bass culture sterile; no parasites of any type.			

Comments.—This case presents several points of interest. In the first place, crescents persisted in the blood in the absence of any asexual forms of *P. falciparum* from 2nd May, 1930, to 11th June, 1930, a period of 41 days, though, towards the end of that period, their number showed a definite decline. Secondly, the table shows very well the action of quinine on the number of crescents; during the 11 days before quinine administration the average crescent count was 238 per c.mm.; during the 10 days of quinine administration the number averaged 1,497; when the patient was then put on to iron and arsenic there was a slow but definite decline in the number of crescents; lastly all crescents were exterminated after the administration of 0.12 gramme of Plasmoquine in 2 days. We shall revert to these points later.

Case 14.—Hindu female child, aged 8, with a history of irregular fever for one year; for the last three months with rigors, vomiting, and headache. Examination of thin and thick films showed a mixed infection with *P. vivax* and *P. falciparum* present.

Date.	Temperature.	Parasites per c.mm.		Forms present.
1-8-29	105°F.	B. T.	5,082	Trophozoites and gametocytes.
		M.T.	3,279	Rings and schizont rings.
2-8-29	98°F.	B. T.	1,733	Growing trophozoites.
		M.T.	667	Rings.
3-8-29	103°F.	B. T.	1,308	Trophozoites and schizonts.
		M.T.	3,077	Rings and schizont rings.

The child was now so ill that alkalies and quinine had to be administered.

Comments.—Delanoë (1917) draws attention to the fact that in mixed infections of *P. vivax* with *P. falciparum*, as a rule one parasite species greatly predominates over the other in the film. Thus in 10 instances which he quotes, in only one were the numbers of the two species about equal; five times *P. vivax* clearly predominated over *P. falciparum;* four times *P. falciparum* predominated over *P. vivax.*

In Case 14, however, we see both species multiplying equally actively side by side in the child's blood.

Case 15.—Behari, Hindu male, aged 28 years, developed malaria whilst undergoing antirabic treatment. Thin and thick blood films and a Bass culture showed a mixed infection with *P. vivax* and *P. falciparum.* The patient further developed amœbic dysentery with *E. histolytica* in his stools.

Date.	Temperature.	Parasites per c.mm.		Forms present.
22-7-29	98.7°F.	B. T.	133	Trophozoites.
		M.T.	267	Rings.
23-7-29	98.2°F.	B. T.	200	Trophozoites.
		M.T.	0	
24-7-29	97.4°F.	B. T.	100	Do.
		M.T.	0	
25-7-29	97°F.	B. T.	90	Do.
		M.T.	0	
26-7-29	97°F.	B. T.	50	Do.
		M.T.	0	
27-7-29	98°F.	B. T.	450	Do.
		M.T.	0	
29-7-29	Bass culture shows *P. vivax* still present, but no *P. falciparum.*			

The patient was now put on to alkalies and quinine.

Comments.—The case was clearly one of low grade residual infection with both species. The malignant tertian infection cleared up spontaneously, whereas the benign tertian infection showed the usual tendency to chronicity.

DISCUSSION.

Unfortunately, a glance through the preceding case notes shows that almost all cases of malaria encountered in hospital work in Bengal are of the endemic, chronic or "residual" type. We meet with few or no fresh infections, and the patient has usually had malaria for a month or more before coming to hospital. Few, if any, primary infections are seen. Hence the material upon which we have had to base our studies is not very satisfactory. Further, the present series only numbers 15 cases. They have been very carefully studied, however, and several points of interest emerge.

Intensities of infections.

It is of course obvious that there must exist a correlation between the number of parasites present and the degree of fever. On the other hand, this correlation is very far from being a close one. We have plotted all counts on untreated cases against the corresponding temperatures, but, whilst it is generally true that high counts are associated with high temperatures, yet the correlation is only a rough one.

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The general association may be seen from the following table:—

Case number.	Range of temperatures.	Range of counts; parasites per c.mm.
	Benign tertian infections.	
1	99.5—103.2°F.	325—2,300
2	97.4—99.4°F.	7,000—24,848
3	98.4—102.4°F.	0—360
	Malignant tertian infections.	
4	97 —104°F.	0—7,160
5	98.4—101.2°F.	0—4,320
6	98.4—99.4°F.	240—2,000
7	98 —99.4°F.	0—314
8	96 —100°F.	40—3,667
9	99.2°F.	120 (rings).
10	98.6—102.4°F.	0—1,120
11	100.2—100.8°F.	760—920
12	98.6°F.	120 (rings).
	Mixed infections.	
		P. vivax. / *P. falciparum.*
13	97.2—103°F.	0—5,680 / Crescents only.
15	98 —105°F.	1,308—5,082 / 667—3,279
14	97 —98.7°F.	50—450 / 0—267

Ross and Thomson (1910) state that in the case of *P. vivax* infections from 200 to 500 parasites must be present per c.mm. to produce fever; the corresponding figures for *P. falciparum* being 600 to 1,500 parasites per c.mm.

In general, our findings agree with these figures, though our evidence goes to show that in established, chronic and "residual" infections the patient may be febrile with much lower counts. On the other hand he may show a high parasite count when the temperature is almost normal; the following being instances from the present series of untreated cases:—

Case 1.	B. T.	9-8-29	99°F.	2,300 parasites per c.mm.
Case 2.	B. T.	8-8-29	98°F.	21,750
Case 3.	B. T.	3-9-29	98.4°F.	320
Case 4.	M.T.	16-7-29	98.6°F.	1,600
Case 6.	M.T.	13-9-29	98.4°F.	1,240
Case 7.	M.T.	1-8-29	98.6°F.	314
Case 8.	M.T.	27-7-29	96°F.	3,200
Case 10.	M.T.	22-7-30	98.6°F.	720
Case 13.	B. T.	11-5-30	97.8°F.	5,680
	M.T.			Crescents only.
Case 14.	B. T.	2-8-29		B. T. 1,733
	M.T.			M.T. 667

The explanation of these counts, of course, is that they were carried out shortly after the malaria rigor and the liberation of merozoites; under such circumstances a high count may be expected with a low temperature.

Conversely, we may encounter low counts with a high temperature. The following are instances in untreated patients:—

Case 3.	M.T.	18-9-30	102.4°F.	360
Case 4.	M.T.	4-7-30	102.8°F.	400
		23-7-30	102°F.	160
Case 9.	M.T.	6-10-30	100.2°F.	80
Case 10.	M.T.	24-7-30	102.8°F.	120
		25-7-30	100.4°F.	0

This phenomenon appears to be confined to infections with *P. falciparum*. The explanation of it lies in the well known fact that, in different individuals, the time at which the growing ring-trophozoites of *P. falciparum* disappear from the peripheral blood stream and concentrate in the blood vessels and capillaries of the internal viscera varies. This fact is well known to malariologists in India, but from much correspondence which we have received, we believe that the medical profession in this country has not properly appreciated the fact that a negative finding in blood films from suspected cases of malaria—even in thick films—has very little value. A further point is that the youngest accolé ring-trophozoites of *P. falciparum* are so minute that they may easily be overlooked in the film. In such instances the crucial test as to whether the patient has or has not got malaria is a Bass culture of 5 c.c. of blood taken from the veins.

Case 4, the patient with experimentally induced malignant tertian malaria, is of special interest since here the course of the infection was followed from its earliest inception. It will be seen that here the incubation period was 13 days, and that on the first day of fever the count was 400 parasites per c.mm. The case of this patient would suggest that the febrile threshold for infections with *P. falciparum* may be lower than the figures given by Ross and Thomson would indicate.

The general, rough correlation between the degree of temperature and the parasite count will be apparent from the following figures for means (Case 2 being excluded, as it was obviously an exceptionally heavy infestation):—

P. vivax infections.

Temperature to nearest °F.	Number of observations.	Mean of counts.
97°F.	5	1,024
98°F.	11	980
99°F.	3	996
100°F.	7	940
101°F.	2	1,655
102°F.	2	2,300
103°F.	3	1,482
104°F.	0	..
105°F.	1	5,082

P. falciparum infections.

Temperature to nearest °F.	Number of observations.	Mean of counts.
97°F.	2	1,840
98°F.	14	295
99°F.	20	690
100°F.	12	1,513
101°F.	6	1,340
102°F.	2	500
103°F.	5	3,391
104°F.	2	4,780
105°F.	1	3,279

It is obvious that the amount of information which we have hitherto collected is insufficient from which to draw any conclusions. There are a large number of factors concerned in determining the intensity of the parasite infestation; the relationship between the schizogony cycle and the time at which the count is taken; the degree of resistance of the patient, in terms of lysis and phagocytosis of parasites; age, for it is well known that malaria infections

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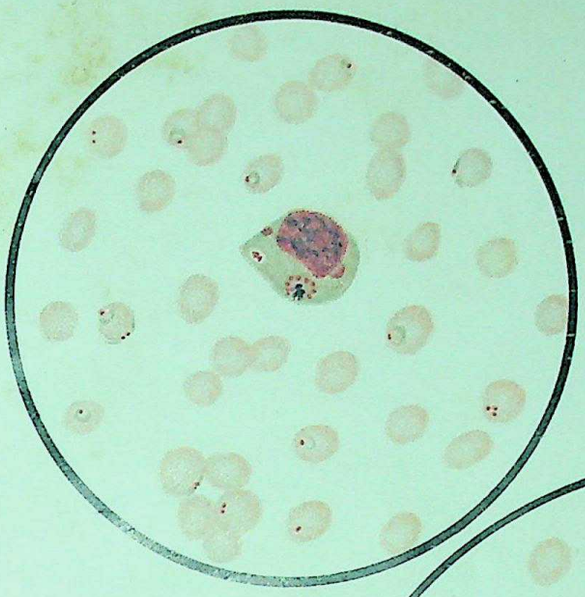
PLATE



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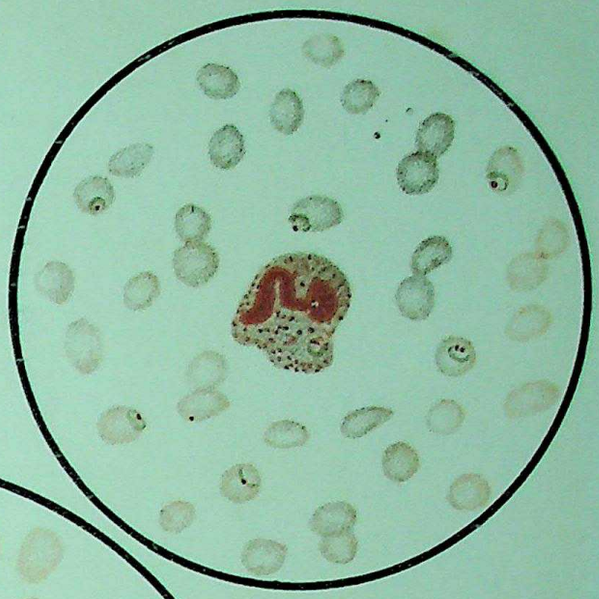

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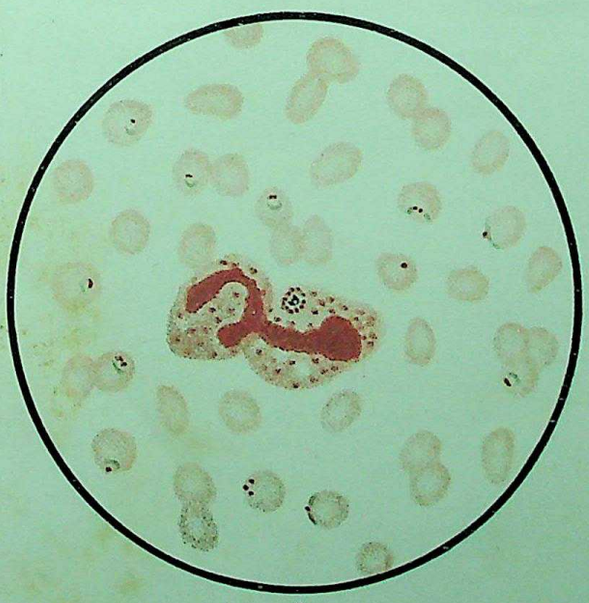

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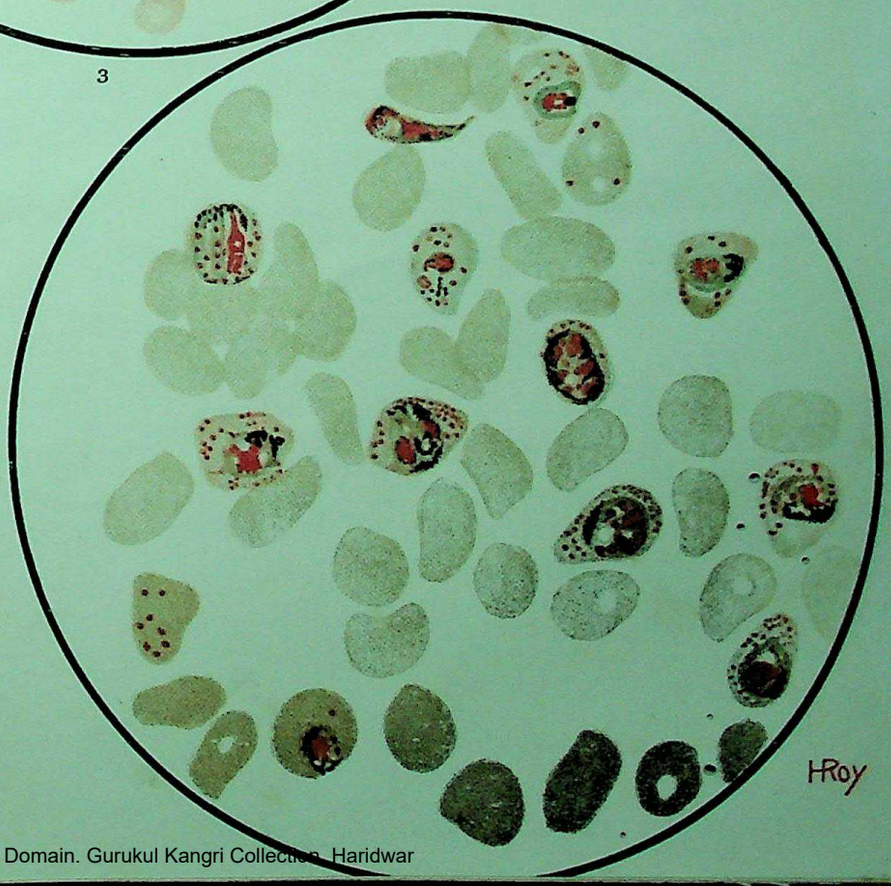

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tend to be much more acute in young children than in adults, at least in hyper-endemic areas, etc. A great deal more information must be acquired before this subject can be studied properly.

As is well known, infections with *P. vivax* tend to be associated with prolonged infections, and relapses which may occur for months, or even years, after the primary infection. This is well exemplified in our present series in Cases 1, 2, 3—in which a relapse occurred in an untreated, afebrile patient whilst he was under observation in hospital, Case 13—an instance of relapse with a progressively increasing degree of infestation, and Case 14—an acute relapse associated with high parasite counts. On the other hand, *P. falciparum* infections (in an endemic area) tend to spontaneous cure, even in the absence of all treatment. This is illustrated in the following instances in our untreated series:—

Case 4; a reduction in the parasite count from 9,360 to 120 in 13 days, though the patient still remained febrile.

Case 5; a reduction in the parasite count from 6,200 to 320 in 11 days, though the patient still remained febrile.

Case 6; a reduction in the parasite count from 2,000 to 240 in 6 days, though the patient still remained febrile.

Case 7; a low grade residual infection, with spontaneous cure without treatment.

Case 10; a tendency for the parasites to disappear, with 2 negative observations out of 9.

Case 13; gametocytes only, without any asexual forms seen, for 41 days.

Case 15; a low grade residual infection with spontaneous cure without treatment.

In brief, we may conclude that in endemic areas infection with *P. falciparum* may lead to one of two results: (*a*) either the infection may be an acute one, with a tendency to cerebral symptoms, and to prove fatal; or (*b*) more usually there is a marked tendency to spontaneous cure, even without treatment, and but little tendency to relapse. (In non-endemic areas, conditions may be quite different.) It will be recalled that during the war several observers in Great Britain and France, as also Colonel Acton at Dagshai, working on European troops repatriated on account of malaria, found that almost all instances of relapse were associated with infection with *P. vivax*, and very few indeed with infection with *P. falciparum*.

The mechanism of spontaneous cure in malaria.

Our studies were commenced with the object, if possible, of ascertaining what is the exact mechanism by which a patient rids himself of a malaria infection. The necessity to treat many of our patients has rather hampered our enquiry in this respect, but a certain amount of information has been accumulated.

Direct observations on this subject in the literature are very few and far between. D. Thomson (1914) has a sketch showing ingestion of merozoites by endothelial cells of the spleen, the material having been obtained at a post-mortem examination. Knowles, Acton and Das Gupta (1923), on the other hand, in a series of spleen punctures carried out on patients suffering from chronic and relapsing malaria, failed to find any evidence of phagocytosis, either by leucocytes or by endothelial cells; there were present in the films parasites in all stages of lysis and dissolution, the chromatin undergoing karyolysis and karyorrhexis, and the cytoplasm becoming progressively more and more vacuolated, until finally the parasites disintegrated, leaving nothing behind but free hæmozoin. Yorke and Macfie (1924) suggest that death of a certain proportion of the merozoites—whether due to quinine treatment, or to the natural powers of resistance of the patient—results in these dead merozoites acting as an antigen; this antigen stimulates the formation of immune body on the part of the patient, and the immune body —if present in sufficient amount—destroys the remaining parasites, thus clearing the patient of infection. Interesting as such an hypothesis is, these authors bring forward no experimental evidence either for or against it.

The whole subject has been fully discussed recently by Taliaferro (1929, pp. 134 to 147). Experimental work on *P. præcox* and *P. cathemerium* of birds has shown very clearly that at each schizogony cycle there is a great destruction of parasites. He concludes that there are at least four possibilities: (*i*) Some antibody mechanism may render the parasite or the combination erythrocyte plus parasite phagocytable; or it may kill or lyse the parasites so that the phagocytes ingest them in various stages of vitality, or even as fragments. (*ii*) Some of the simpler serum constituents of the blood may so injure the parasites that they become moribund or disintegrate, whereupon the phagocytes remove them. (*iii*) The phagocytes themselves may become changed or "educated" so as to ingest the parasites. Or, finally, (*iv*) the reticulo-endothelial system as a whole may be greatly augmented and this result in an increase of non-specific phagocytosis. Further, the titre of the blood sugar may be concerned in the matter—probably indirectly. Thus Hegner and MacDougall (1926) and MacDougall (1927) have found that increasing the blood sugar in infected birds by feeding them with solutions of glucose brings about conditions favourable to the accumulation of parasites in the blood, whereas decreasing the blood sugar by injecting insulin probably inhibits the accumulation of parasites.

Thomson and Robertson (1929, Plate III) figure a polymorphonuclear leucocyte with two ingested schizont-rosettes of *P. falciparum*, though they do not mention the source from which this material was derived. We have very frequently observed the same phenomenon in

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Bass cultures. Case 5 in our present series proves definitely that malaria merozoites, and even schizonts, are definitely phagocytosed, even in the peripheral circulation, by both polymorphonuclear and large hyaline mononuclear leucocytes.

As far as our studies have gone, they lead us to the tentative conclusion that the mechanism by which parasites are destroyed is not a simple one. It must be remembered that the malaria parasites are free in the plasma only during their very brief merozoite phase, and that they quickly become attached to the erythrocytes to initiate a new schizogony cycle. They are thus liable to phagocytosis for only a brief period of their life cycle, unless the combination erythrocyte plus parasite is ingested. We believe that probably what happens is that, when the mature schizonts burst and liberate their showers of merozoites, many merozoites are destroyed by lysins present in the plasma; others are destroyed by being phagocytosed by the polymorphonuclear and large hyaline leucocytes; whilst possibly the chief site of phagocytosis is in the spleen and reticulo-endothelial system. The reason why phagocytosis of merozoites is only so very rarely observed in films of the peripheral blood is the very brief duration of the free merozoite phase, which is the chief phase during which phagocytosis occurs.

Much further study of this subject is wanted, for it raises all sorts of supplementary questions, such as the use of malaria antigens in prophylaxis and therapy, the administration of insulin in the treatment of malaria, and of measures to stimulate the reticulo-endothelial system. Unfortunately we are not in a position to obtain fresh post-mortem material for study, but spleen and liver punctures carried out at the right period of the schizogony cycle might afford much information.

The production of gametocytes by P. falciparum.

It is a well known fact that the production of gametocytes by *P. falciparum* is a very variable phenomenon. For a full discussion of this matter we may refer the reader to Knowles and Senior White (1930). In general, infections with *P. falciparum* in India are associated with a considerable output of crescents (except in the Jeypore Agency Tract, where the reverse holds true). On the other hand, infections with *P. falciparum* in West Africa are associated with an extremely scanty output of crescents, and that in spite of the widely endemic incidence of this type of malaria in that terrain.

Again, the season of the year appears to have an influence on the production of crescents. In patients seen in July and August, infected with *P. falciparum*, no crescents may be found, whereas in similar patients examined in November and December many crescents may be present.

Thirdly, age has an important bearing on this matter. Thus Soesilo (1929) working in Nias Island off the coast of Sumatra, found that 20.6 per cent. of 297 children infected with *P. falciparum* showed crescents; whereas only 4 per cent. of 148 adults similarly infected showed crescents.

The different views held as to the factors concerned in the production of crescents are fully discussed by Knowles and Senior White (1930); so we need not enter into the subject in the course of the present paper. There appears to be some evidence, however, that in some individuals *P. falciparum* tends to produce gametocytes, whereas in other individuals it does not. Of the 12 cases of infection with *P. falciparum* in the present series, no crescents were seen in the following untreated cases:—

Case number.	Season of the year.	Number of days under observation.
7	August	13
8	July	5
10	July	20
14	August	3
15	July	8

The following cases showed crescents.

Case number.	Season of the year.	Maximum output of crescents.
4	July	..
5	September	1,640 per c.mm.
6	September	2,400 per c.mm.
9	September	800 per c.mm.
11	August	..
12	September	1,600 per c.mm.
13	September	3,060 per c.mm.

The number of cases observed so far is very small, but the above figures would appear to indicate that crescent production is much more likely in September than in July or August. Further data on this subject should be collected, for at present we are profoundly ignorant with regard to the factors which bring about or influence gametocyte production by all three species of malaria parasites.

The action of quinine on the gametocytes of P. falciparum.

It is a well known fact that the administration of quinine does not affect the viability of the crescentic gametocytes of *P. falciparum*. What is less well known is that the administration of quinine often brings about a great increase in the number of crescents in the peripheral blood. Sinton (1926) was apparently the first observer to note this phenomenon. His figures at Lahore were as follows:—

British troops.—82 examined. Crescent carriers: 7.3 per cent. before treatment; 25.2 per cent. after treatment.

Indians.—618 examined. Crescent carriers: 6.9 per cent. before treatment; 25.2 per cent. after treatment.

Clark (1927), working from April to September in the littoral of the Caribbean sea, noted

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the same phenomenon. He found in general survey work a gametocyte rate of 13.5 per cent.—mostly crescents. On the other hand a series of 124 cases from 8 hospitals examined gave a gametocyte rate of 45.9 per cent.—mostly crescents. These were afebrile patients, who had been under full quinine treatment. "It is my belief," he writes, "that the degree and promptness of gamete invasion of the peripheral blood stream following a vigorous use of quinine in æstivo-autumnal fever is not very generally known, and that the long period over which many treated cases show a persistence of gametes in the peripheral blood is also not understood. These are very important facts to be kept in mind by those of us who are attempting to control malaria in the Tropics."

Four cases in the present series illustrate very well the influence of quinine on the number of crescents in the peripheral blood. In Case 5 the crescent count was steadily rising before the administration of quinine, whilst the schizogony cycle had re-appeared in the peripheral blood. The first day's quinine administration failed to check this rise, and the patient was then put on to Plasmoquine. In Case 6 both the schizogony cycle and the number of crescents was tending to fall when alkalies and quinine were administered; here the administration of quinine abolished the schizogony cycle within 48 hours, whilst the number of crescents was at first reduced, but then rose again. In Case 12 the administration of quinine immediately abolished the schizogony cycle, but there was an extremely marked and sustained rise in the number of crescents. In Case 13 the schizogony cycle (of *P. falciparum*) had ceased and for 12 days the crescent count was a low one, ranging from 60 to 800; here the administration of quinine sent the count right up to from 1,360 to 2,040 per c.mm.

We may conclude that if active schizogony is going on at the time when quinine is administered, the quinine will abolish the schizogony cycle, and the crescent count will fall, as the number of trophozoites available for crescent production diminishes. On the other hand, if there is only a low residual schizogony cycle present, this will of itself tend to increase the number of crescents, as the parasites prepare to pass into their sporogony cycle; administration of quinine here will cause a rise in the crescent count. During convalescence, with the schizogony cycle absent from the peripheral blood, but with numerous crescents developing in the internal blood stream, the administration of quinine will cause a marked and sustained rise in the crescent count.

Whatever the cause of this rapid rise in the crescent count when quinine is administered to patients with "residual" infections, the phenomenon is a very real one, and from the point of view of epidemiology and malaria-prevention all cases of malignant tertian malaria should receive Plasmoquine as well as quinine—at least during the autumn months.

The action of Plasmoquine on the gametocytes of P. falciparum.

The literature on the subject of Plasmoquine is already so enormous that here we will not attempt to review it. It is well summarised by Sinton and Bird (1928) and by Sinton, Smith and Pottinger (1930). All authorities are agreed that it has a very markedly destructive action on the crescentic gametocytes of *P. falciparum*, and that it constitutes a most important addition to the physician's armamentarium. On the other hand, most of those who have used the drug comment on its toxicity. Further, the toxicity appears to be a phenomenon of individual susceptibility rather than one of dosage. One cannot tell beforehand whether a given patient will or will not show toxic symptoms.

For this reason, it is very essential that the minimum lethal dose of Plasmoquine to crescents shall be worked out. Recent papers show that medical men are now using very much smaller doses than were at first advocated by the manufacturers. Our present series here reported shows that even these doses may be unnecessarily large. Thus we have the following figures:—

Case number.	Total dose of Plasmoquine that exterminated all crescents.	Number of days in which this dose was administered.
4	0.04 gm.	24 hours.
5	0.06 gm.	6 days.
6	0.03 gm.	3 days.
9	0.04 gm.	4 days.
11	0.04 gm.	24 hours.
12	0.05 gm.	5 days.
13	0.18 gm.	3 days.

The crescent counts were very high in Cases 6 and 13. In Case 5 only one very degenerated crescent was seen after a total dosage of 0.04 gm. in 4 days. In all cases the final proof of eradication of the infection was that a Bass culture taken with 5 c.c. of the patient's blood after the cessation of all treatment remained sterile.

Not only is this the case. The destructive action of Plasmoquine on crescents can be studied under the microscope. Within 24 hours of commencing Plasmoquine administration the crescents are seen to have become swollen and rounded; their outline becomes irregular; the chromatin breaks up by karyorrhexis, and the crescent stains very badly. Within 48 hours of commencing Plasmoquine administration many of the crescents present in the films are almost unrecognizable as such.

We may conclude that a total dosage of 0.06 gm. of Plasmoquine is sufficient to eradicate all crescents, even where the infestation is a very heavy one. This total dosage is probably best administered as a dose of 0.01 gm. daily for six days. A total dosage of 0.04

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gm. spread over 4 days is often sufficient to eradicate all crescents.

A standard treatment for malaria.

In general practice we follow Colonel Sinton's well known method of treatment for malaria. This has been recently summarised by him in this journal (Sinton, 1930).

We have experienced certain drawbacks, however, with Sinton's method. These may be summarised as follows:—

(*i*) It is impossible except in a well organised hospital to adhere to the rigorous time table which the method demands. It is impossible to follow it out in out-patient work, or with collections of labour.

(*ii*) Very few Bengali Indian patients will take 30 grains of quinine a day in solution. Relatively sturdy British troops and up-country Indians can stand 30 grains a day, but in Bengal, at least, the weight of the ordinary Indian patient is much below that of the European, and any dosage over 20 grains a day in solution is apt to produce symptoms of cinchonism. Even with well educated Indian patients who are anxious to get their malaria eradicated and who conscientiously follow out orders, it is rarely possible to get them to take more than 20 grains a day.

(*iii*) The dosage of magnesium sulphate in the quinine mixture is rather drastic. It is essential, of course, to keep the patient's bowels open, but few Europeans, at least, could stand one drachm of magnesium sulphate t.d.s. for a week.

(*iv*) Whilst Indian patients, who tend to have a low gastric acidity, can take one drachm of sodium bicarbonate t.d.s., few or no European patients can tolerate this dose comfortably.

For this reason, we have somewhat modified Sinton's formulæ, and suggest the following scheme.

(*a*) *Hospital in-patients.*

Whenever possible, a preliminary dose of calomel and a saline purgative are given before the routine administration of alkalies and quinine is commenced.

Alkaline mixture.

℞ Sodii bicarbonatis	..	gr. lx.
Sodii citratis	..	gr. xl.
Calcii chloridi	..	gr. iii.
Aquam ..	..	oz. i.

(To be well shaken before giving, as it is a suspension rather than a clear solution.)

Quinine mixture.

℞ Quininæ sulphatis	..	gr. x.
Acidi citrici	..	gr. xxx.
Magnesii sulphatis	..	gr. xx.
Aquam ..	..	oz. i.

Dosage.—One oz. of the alkaline mixture b.d., followed half an hour later by one oz. of the quinine mixture b.d. Treatment to continue for ten days.

The 24 hours' urine should be collected each day and tested with Mayer's reagent to make certain that the quinine is being absorbed.

During the last six days of the treatment, the patient should also receive 0.01 gramme of Plasmoquine once daily.

The idea underlying this line of treatment is first to make an onslaught against the schizogony cycle, then during the last six days to reinforce this with Plasmoquine in order to get rid of all gametocytes. The final test for cure should be that a Bass culture, taken with 5 c.c. of the patient's blood after all alkaloids have been eliminated as tested in the urine, should remain sterile.

For European patients, the sodium bicarbonate should be omitted from the first prescription, and the dose of sodium citrate increased to one drachm.

Total dosage: 200 grains of quinine taken in solution in 10 days, with alkalies; plus a total of 0.06 gramme of Plasmoquine during the last 6 days.

(*b*) *Out-patients and mass treatment for labour forces.*

Here we shall have to fall back upon cinchona febrifuge in tablet form. As the present series of cases shows, the absorption of the official Government tablet is most uncertain and unsatisfactory. The Indian, and not the Java, febrifuge should be used, as the latter contains a higher proportion of cinchonine. Unfortunately, the composition of even the Indian febrifuge is not constant; if it contains a high cinchonine content it is apt to induce vomiting.

Not less than gr. xxx. of the Indian cinchona febrifuge should be given daily for ten days, in the case of an adult. If possible, each dose should be preceded by a dose of the alkali mixture given half an hour beforehand. During the last six days of the ten, the patient should take in addition 0.01 gramme of Plasmoquine once daily. The cinchona febrifuge is probably best administered as three doses, each of gr. x., during the day.

The relative insolubility of the official cinchona febrifuge tablets appears to be due to included resinous matter, and it is greatly to be desired that steps should be taken to purify and improve the official tablets, and to render them more soluble.

* * * * * *

Summary and conclusions.

1. Details are given of fifteen cases of benign tertian or of malignant tertian malaria, admitted to hospital, and studied by cultural and enumerative methods. Many of these

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cases were kept untreated for as long as possible in order to study the mechanism of spontaneous cure in malaria.

2. In Bengal, but few cases of acute primary malarial infection are seen. Most patients, when admitted, have had the disease for a month or more, and show chronic and "residual" infections only. The series, however, illustrates the tendency of infection with *P. vivax* to produce a chronic disease associated with relapses, and, on the other hand, the marked tendency to spontaneous cure in infections with *P. falciparum*.

3. The mechanism of spontaneous cure in malaria is probably not a simple one. It is probably associated with the production of lysins in the plasma; with phagocytosis of the merozoites by polymorphonuclear and large hyaline leucocytes—which the present paper proves to occur; and with the activity of the reticulo-endothelial system.

4. In Bengal, *P. falciparum* infections during September appear to be more closely associated with a large output of gametocytes than do infections in July and August.

5. In "residual" and convalescent cases of malignant tertian malaria the administration of quinine has the paradoxical effect of greatly increasing the number of crescents in the peripheral blood stream.

6. The administration of a total dose of 0.06 gramme of Plasmoquine in six days is sufficient to exterminate the gametocytes of *P. falciparum* from the peripheral blood stream.

7. A suggested standard treatment for malaria is outlined. In this 200 grains of quinine are administered in solution in 10 days, together with alkalies; and 0.01 gramme of Plasmoquine daily for the last 6 days of treatment.

* * * * * *

Acknowledgments.

We cannot conclude this article without most gratefully acknowledging the most helpful suggestions which we have received from Lieut.-Col. H. W. Acton, I.M.S., Director, Calcutta School of Tropical Medicine. Acknowledgment is also due to Sister North, Matron of the Carmichael Hospital for Tropical Diseases, and to the nursing staff of the hospital for their careful nursing of these patients.

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THE DIAGNOSIS OF LYMPHATIC OBSTRUCTION OF FILARIAL ORIGIN.

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THE necessity for a paper dealing with the clinical aspect of the diagnosis of filarial obstruction seems very great owing to the

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numerous errors seen in textbooks and papers on tropical diseases which deal with this subject. Nowadays there are so many experts claiming special knowledge about a particular disease, on an experience limited to a single expedition involving a few months' duration in the country where the disease is endemic, that one has ceased to be surprised at seeing such persons indulging in wide generalisations about tropical diseases, and betraying an appalling amount of ignorance about local conditions as their visits generally coincide with the most healthy season of the year. Facts which are of commonplace knowledge to the dwellers in these places are often ignored and many of these have never been properly appreciated; an excellent example is provided by Stephens in his article on *Filaria bancrofti* in Byam and Archibald's book on the *Practice of Medicine in the Tropics*, Vol. 3, page 1903. After devoting 34 pages to discussing the disease, he comes to the summary of the evidence and commences "What is the evidence that *Filaria bancrofti* is the cause of these various diseased conditions of the lymphatic system? It is unfortunately by no means conclusive, but such as it is may be considered under three heads":—

(*a*) Geographical—and here he appears to be completely puzzled about two cases of chyluria occurring in persons who have never been out of England, and ends up the section. "This almost complete agreement in geographical distribution does not, of course, furnish proof of cause and effect."

(*b*) Epidemiological. This is based on the microfilarial rate, chiefly deduced from Manson-Bahr's monograph on filariasis (1912)—as seen in Fiji, and other evidences of its association with elephantiasis and he states "again there is apparently no definite relationship between the microfilaria rate and the elephantiasis and abscess rates, respectively, in different countries."

(*c*) Pathological. Stephens acknowledges the existence of adults and microfilariæ in the lymph vessels and glands producing inflammatory changes resulting in a block in the flow of lymph. "It is to such blocks that the various conditions are usually attributed, but that this explanation is true seems to be far from clear."

He finally states "to sum up then there appears to be a prima facie case that *Filaria bancrofti* is responsible for those various pathological conditions, but the question cannot be regarded as settled, much further work on the subject being required."

We will now proceed to deal with these various points mentioned by Stephens.

Lymphatic obstruction is not always due to *Filaria bancrofti*. In Europe there are cases of elephantiasis nostra, and hydrocele, which have never been attributed to filarial infection in spite of their external resemblances to filarial elephantiasis and hydrocele. Even chyluria need not in all cases be due to this filaria, as any lymphatic obstruction in this area, i.e., in the juxta-aortic glands, will give rise to chyluria. Acton and Sundar Rao (1929) have already shown that in filarial lymphatic obstruction part of the obstruction is due to the toxins of the *Filaria bancrofti* and a large share due to septic infection by the staphylococcus and streptococcus. In Europe these cases are due either to mechanical causes such as obstruction from growth, pressure, and removal of the lymphatic glands, or as the result of a septic inflammation in the lymphatic area. The next point we showed was that the type of lymphatic glandular obstruction varied according to the possibilities of intense or light infections (Acton and Sundar Rao, 1930). Thus the type seen in hyper-endemic areas is different from that in the endemic areas, and the types seen in endemic areas are different from types in areas of low endemicity. Other instances of the fallacious ideas about the immunity of Europeans, the rate of incidence in the different sexes, etc., are based on impressions and not on facts as seen locally.

The microfilaria rate amongst the apparently healthy individuals and those cases showing signs of filarial obstruction has been evidently very puzzling to Stephens in summing up this evidence. The microfilaria is in a sheath, is born in the lymphatics and has no power of penetrating through the tissues. Naturally when lymphatic obstruction is present the microfilaria cannot get into the blood stream —so the rule as regards the microfilaria rate is as follows:—Persons with microfilariæ in their peripheral blood usually have little or no symptoms and only 5 per cent. show evidence of lymphatic obstruction. Of persons showing evidences of lymphatic obstruction only 5 per cent. show microfilariæ in their blood. This rule is exclusive of the chyluria cases who generally show microfilariæ in the blood; any one having a great deal of personal experience with the pathological manifestations of filariasis will soon appreciate the reason for this anomaly, as it is obvious why microfilariæ cannot easily be found in the blood when obstruction is present. A microfilaria rate above 5 per cent. in cases of elephantiasis would make us suspicious of these figures as regards errors of chance sampling, etc. Our statement is based on the combined experience of both of us extending over a period of ten years; one of us (S. S. R.) has devoted the whole of his time to this subject and studied the disease under different conditions of endemicity.

Pathologically.—A fallacious notion about the œdema produced in elephantiasis appears to be prevalent amongst some professors in medical institutions, who teach that the œdema and swelling produced in this disease does not

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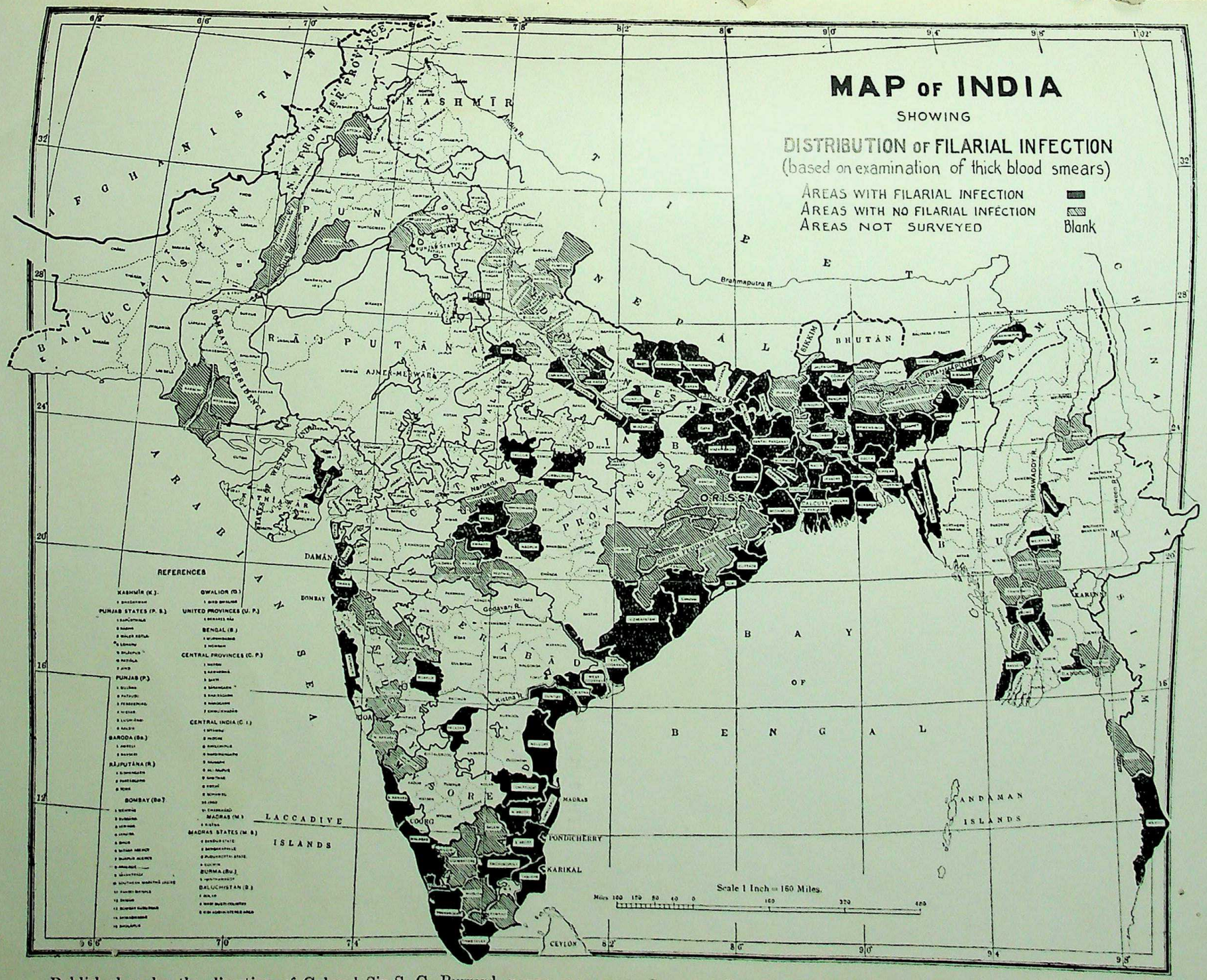

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PLATE I.

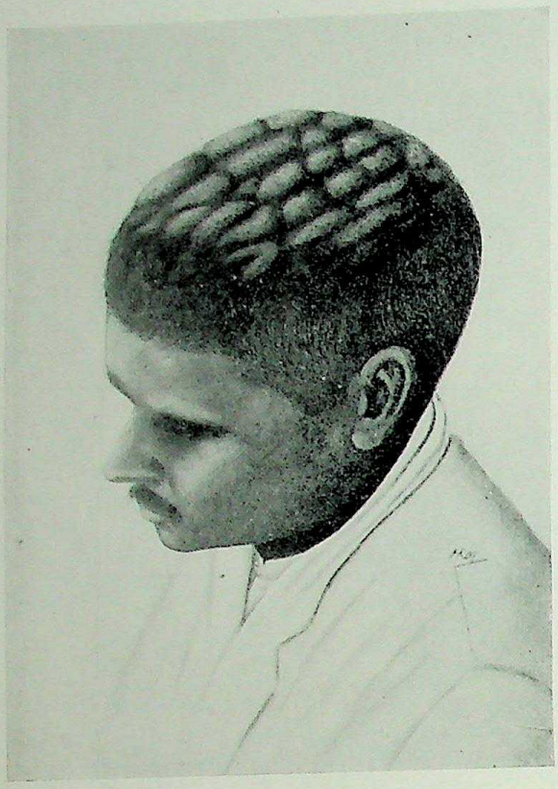

Fig. 1.—Cutis verticis gyrata.

Fig. 2.—Diffuse fibro-neuroma.

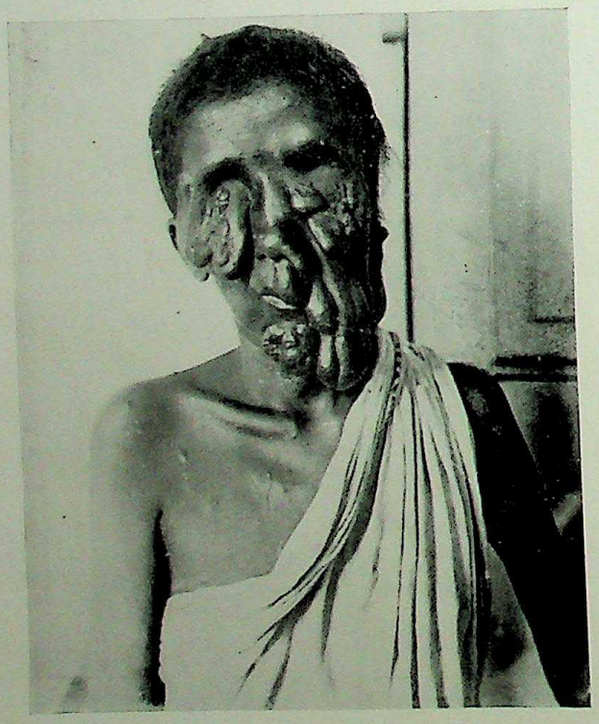

Fig. 3.—Von Recklinghausen's disease

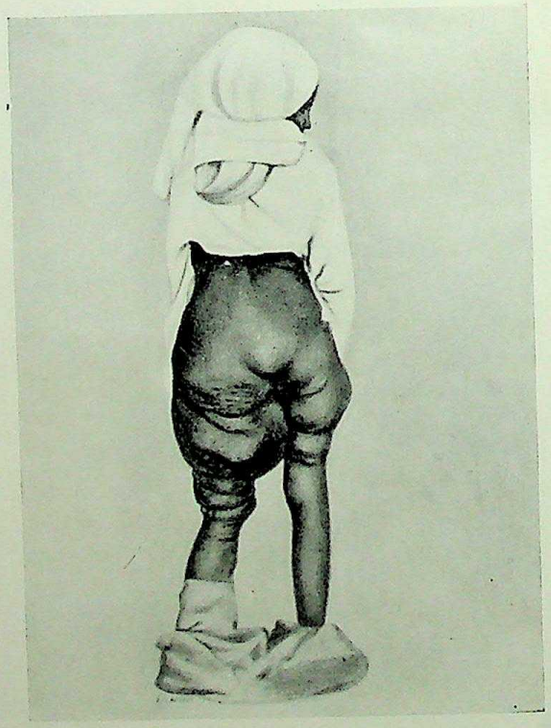

Fig. 4.—Diffuse fibromatosis.

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pit on pressure like œdema due to other conditions such as renal insufficiency. It is true that the elephantoid skin does not pit on pressure, but it takes a large number of years for this dense fibrous tissue to be laid down in the deeper tissues, to make this statement to be of any value in clinical diagnosis. The pathology has been fully described by us in a paper, entitled "Kataphylaxia—a phenomenon usually seen in acute filariasis." We may state definitely that the *Filaria bancrofti* is responsible for most of the lymphatic obstruction seen in endemic and hyper-endemic areas. On the other hand we would hesitate to make such a diagnosis by a casual glance at a person who has lived in a non-infected area or who shows hypertrophies of the skin in regions such as the scalp, buttocks or lips, etc. The commonest errors in diagnosis we have seen made are due to confusing with filarial lymphangitis with giant urticaria, because the arm is swollen, dermatolysis, and pathological changes due to hypopituitarism. Examples of these mistakes can be seen in textbooks, and in papers written by experts.

Ignorance of the tropical conditions and a limited experience of this infection is accountable for most of the mistakes.

We propose to discuss what we consider to be fundamental differences between the obstruction produced in filariasis and the other lesions which have been mistaken for it. We will restrict our discussion to the types of lymphatic obstruction seen on the limbs, breast and genitalia.

Conditions necessary for filarial obstruction.

We shall first deal with filarial obstruction, and refer to lesions mistaken for filariasis in the latter part of the paper. In previous contributions (1929 and 1930) we have emphasised the existence in India of hyper-endemic, moderate and low-endemic regions and have referred to the different kinds of filarial manifestations in these areas. The accompanying map (Map 1) illustrates the distribution of the intensity of the infection in this country. A word of explanation regarding the construction of the map may not be out of place. Blood smears were obtained from jails, hospitals, educational institutions and from the public and in many cases they were supplemented by personal study in the field. The statistics may be taken as representative of the areas. Looking at the map it is seen that the distribution is fairly heavy along the low-lying coastal plains and river basins, while hilly tracts and regions far in the interior show comparative freedom of infection.

These areas have been divided into hyper-endemic, endemic, and areas of low endemicity according to microfilaria rates of 20 per cent. and over, over 10 per cent. and under 20 per cent. and under 10 per cent. respectively in the population.

A regional division may be found to repeat itself even locally. We have pointed out in an earlier paper (1930) how in the same area one locality may be under hyper-endemic conditions and another be completely free from the infection. The interesting instance of the low rate of Culex infection in the Civil Surgeon's quarters situated on the outskirts of Cuttack town, and the heavy Culex infective rate in the crowded city was cited in support of such a classification.

Thus an individual may stay in a hyper-endemic town for a number of years, actually residing in a ward of the area which has only a low endemicity. Under such conditions it may take several years to bring about an obstruction of the superficial inguinal glands. On the other hand, in the crowded parts of the same town, which, on account of the density of the population and of the associated insanitary conditions, gives rise to heavy breeding of *Culex fatigans*, heavier infection results and obstruction takes place fairly early in life. This time factor is a very important one in diagnosis as the patient must have been resident sufficiently long in the particular area in order to develop elephantiasis and lymphatic obstruction, which may vary from 8 to 20 or more years. As has been shown by us (1930) in a heavy endemic area there must also be the synchronisation of the season of the breeding of *Culex fatigans* with the period of transmission.

The rarity of filarial infection and disease amongst Europeans is sometimes cited as evidence of a racial factor having something to do with their apparent immunity against the infection. Such a supposition conveniently ignores the fact that, as a class, Europeans in the tropics invariably live in less crowded areas in houses with sanitary drainage and usually take precautions against mosquito bites by using fans and mosquito-nets. It is therefore not strange to find a very low rate of infection amongst the European population. Our work at Calcutta with regard to the race factor and immunity brings out conclusively that all nationalities, including Europeans living under identical conditions, are equally susceptible to the infection (1930).

The intermediary host—*Culex fatigans*—being nocturnal in its habits generally bites the limbs, especially the lower limbs as being the most convenient part to attack, and inflicts its bite, thus transmitting the filarial embryos. The head, face and other regions of the body are not usually selected as they are not so easily accessible and so bites on these areas are rarely observed. Naturally obstruction of the limbs, breasts and genitalia are the most common types of lymphatic obstruction seen in this disease. When we find swellings in places like the buttock, face, scalp, etc., we may

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safely conclude from our knowledge of the disposition of the lymphatic drainage of these areas that the cause of obstruction cannot be filariasis. We have discussed fully the mechanism of the lymphatics in relation to filariasis in our other papers (1930 and 1930*a*) and so do not repeat it here.

Pathological findings.

When obstruction in the lymphatics develops the microfilariæ are lodged beyond the obstruction and cannot reach the general circulation. For this reason in cases of advanced obstruction the microfilariæ are practically always absent from the blood (*vide* Table I). The adult filariæ are lodged in the dilated lymphatics below the gland which is enlarged and obstructed as the result of continued filarial irritation. Such cases have been recorded in the course of our work at the Calcutta School of Tropical Medicine (Sundar Rao, 1930). This is further supported by our observations on the eosinophile reaction in persons showing microfilariæ compared with those in whom elephantoid conditions have developed to an advanced stage (*vide* Table II). The lower figures in the obstructive cases indicate that the toxins and parasite products do not enter the general circulation in these cases.

TABLE I.

Showing the incidence of microfilariæ in the blood of normal persons compared with cases of elephantiasis.

	Total examined.	Total showing microfilariæ.	Percentage.
Normal persons.	2,456	363	14.7
Cases with elephantiasis.	932	53	5.7

This fluid containing microfilariæ may be obtained from the lymph that oozes from the skin (lymphorrhœa) in cases of lymph-scrotum, lymph-varix of the extremities, or it may be obtained from the tappings of the dilated lymphatics. Microfilariæ are often found in this fluid, although entirely absent from the general circulation. On the other hand they are rarely present in hydrocele fluid as the lymphatic vessels are usually intact.

Previous history.

The most important point to bear in mind in the diagnosis of filarial disease is the previous history of the patient. When he comes from a hyper-endemic area we should examine for such clinical signs as enlarged epitrochlear and superficial inguinal glands, whether painful and tender, peri-adenitis, lymph-varices, fugitive swellings, filarial lymphangitis, filarial abscesses and the development of elephantiasis of the legs, arms and breasts. Patients coming from endemic areas where these hyper-endemic conditions do not exist generally only show slight enlargement of these glands, evidences of development of moderate elephantoid swellings of the legs and genitalia, less frequently of the breasts or arms. Those that come from areas where the filarial endemicity is low may show chyluria, chylocele and lymph-varix as the more commoner manifestation of filarial obstruction.

These facts are of great importance in the clinical examination and diagnosis of filarial diseases, and a recognition of them would prevent classifying *any* swelling as due to filarial disease, and also prevent overlooking cases who are definitely suffering from filarial disease.

Lesions mistaken for those produced by the F. bancrofti.

We have so far surveyed briefly the different types of filarial manifestations, and we will now consider certain pathological lesions which are commonly mistaken for filarial obstruction and why these errors have occurred in the diagnosis.

TABLE II.

Showing the eosinophilia rate.

Percentage.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total.
In cases with microfilariæ only.	0	0	13	11	10	5	9	4	10	12	5	8	3	5	1	3	1	0	0	0	100
In cases with filarial diseases without microfilariæ in the peripheral blood.	3	11	26	17	12	19	3	2	1	1	1	3	0	1	0	0	0	0	0	0	100

One other interesting fact in this connection is that we have frequently found microfilariæ in the lymph below the obstruction, whereas the peripheral blood contains no microfilariæ.

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PLATE II.

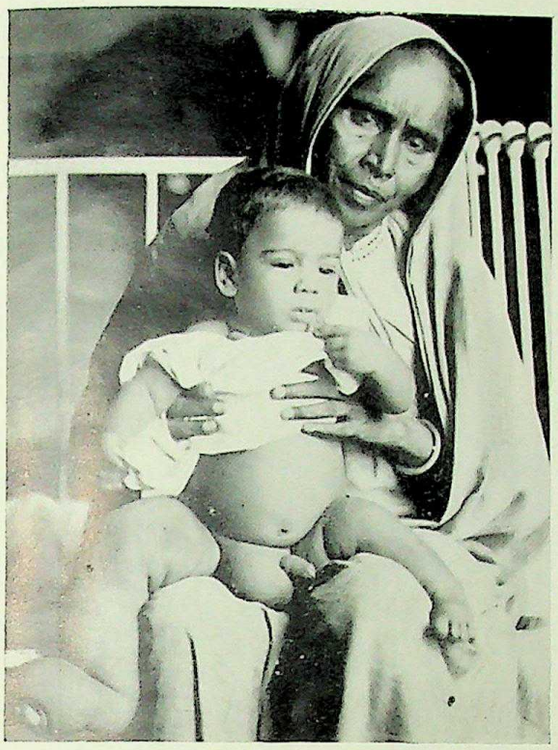

Fig. 1.—Diffuse fibromatosis of the right leg and scrotum (aged 11 months).

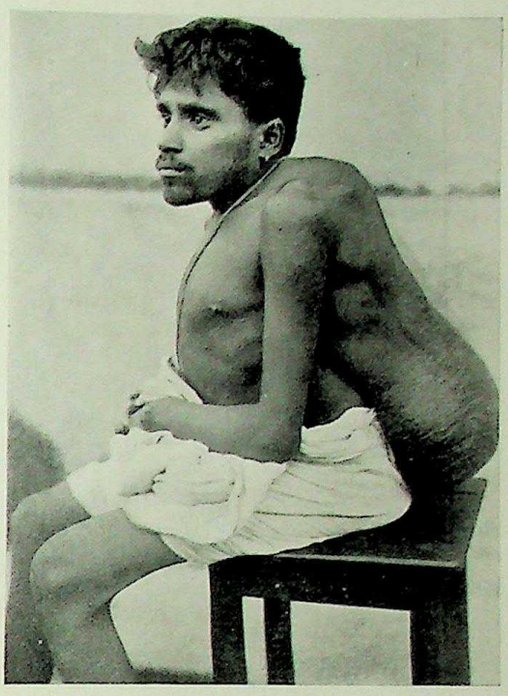

Fig. 2.—Fibro-lipoma of the back.

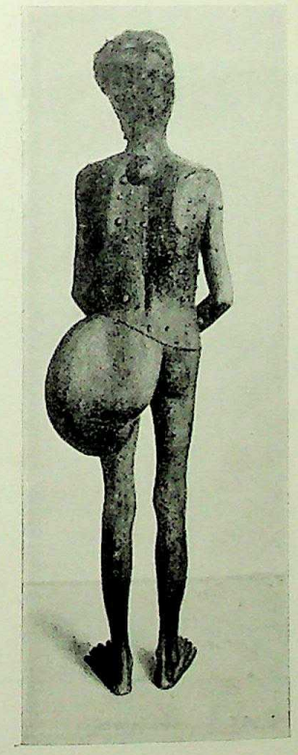

Fig. 3.—Von Recklinghausen's disease.

Fig. 4.—Hypopituitarism.

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PLATE III.

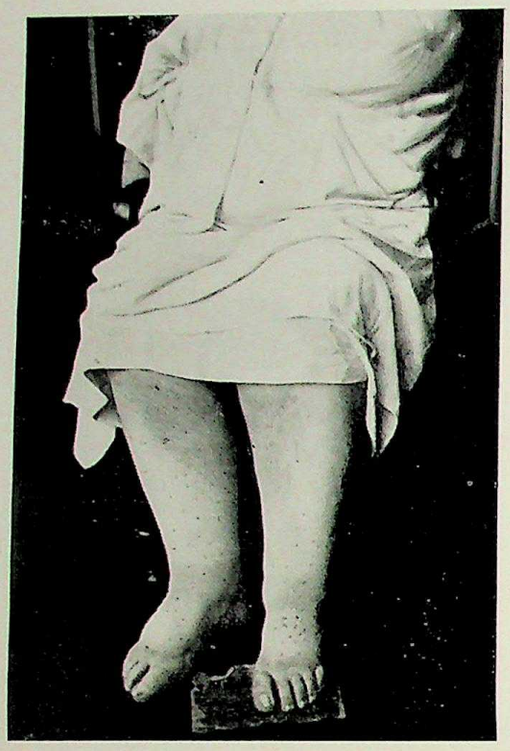

Fig. 1.—Early case of hypopituitarism.

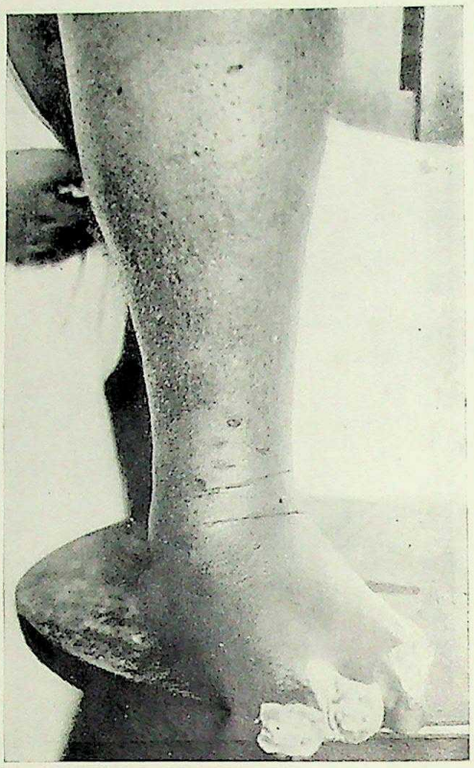

Fig. 2.—Raynaud's disease.

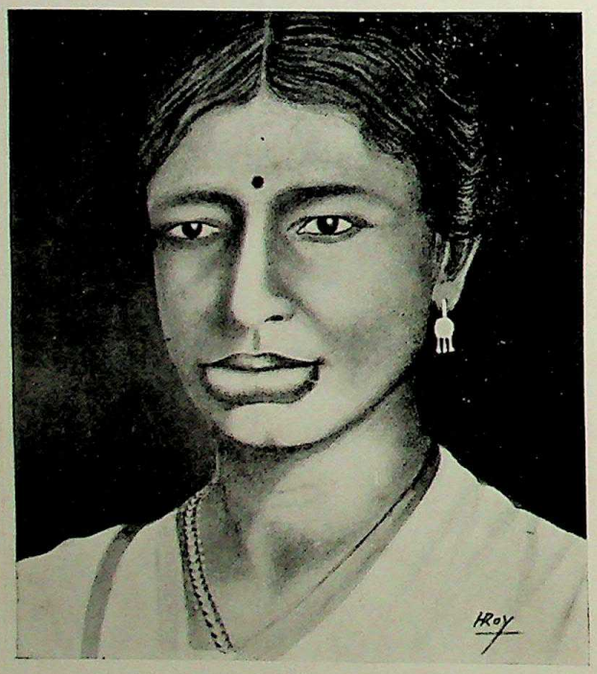

Fig. 3.—Elephantiasis nostra.

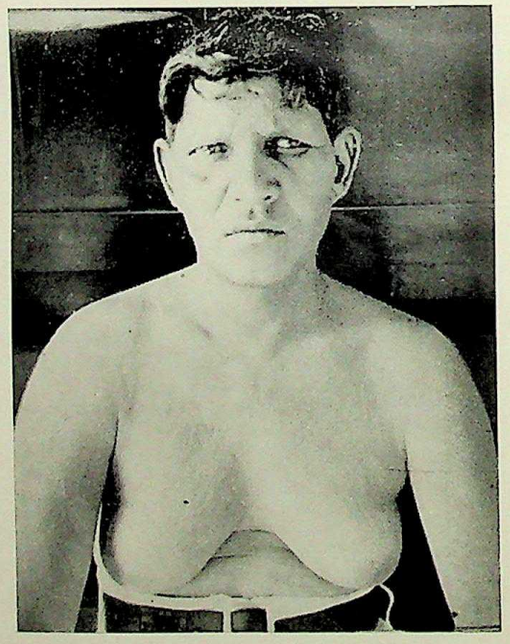

Fig. 4.—Macrogymnastia.

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(*i*) *Diffuse fibromatosis* (*dermatolysis*) is a fairly common pathological condition in the tropics and is often mistaken for filarial obstruction. This diffuse fibromatosis is really a late and rare stage of the lesions produced in the syndrome known as von Recklinghausen's disease. The apparent hypertrophy of the skin is due to a diffuse fibromatosis of this area and has been unfortunately named dermatolysis in most textbooks on dermatology. The lesion is not due to a dissolution of the skin, but to the formation of soft fibromatous growth formed by an overgrowth of the perineural sheaths of the nerve fibres supplying the subcutaneous tissues and corium, so that the skin hangs in large pendulous folds. This fibromatosis may attack the scalp, when it is spoken of as cutis verticis gyrata, an example of this is depicted in Plate I, fig. 1. Lieut.-Col. Harnett, I.M.S., kindly sent us the case depicted in Plate I, fig. 2—a pendulous growth springing from the back of the scalp; microscopically it was seen to be a diffuse fibroma from the neurilemmal sheath of the nerves. The fibromatosis may attack the face when the skin hangs in long pendulous folds from the eyebrows, cheeks, etc. Plate I, fig. 3, depicts such a case in a beggar woman aged about 40. The folds had been increasing in size from the age of 20, her son aged 18 was also suffering from the von Recklinghausen's syndrome. In the woman, no neurofibromata were felt along the course of the nerves, but she had multiple fibromata and pigment patches. She informed us that she could only see when the pendulous folds of skin hanging from the eyebrows were lifted up by the hand; otherwise she merely saw the ground in front of her feet through a small slit. This diffuse fibromatosis may involve the skin of the buttock (*see* Plate I, fig. 4). We are indebted to Dr. M. Umar for permission to use his plate published in the *Indian Medical Gazette*, 1927. Recently we had a case of a child of 11 months with diffuse fibromatosis of the right leg and scrotum (Plate II, fig. 1). We are indebted to Major J. C. John, I.M.S., Civil Surgeon, Cuttack, for this photograph, Plate II, fig. 2, illustrating a large fibro-lipoma of the back. Major-General Coppinger, D.S.O., I.M.S., kindly sent us this case (Plate II, fig. 3) to include in our collection of these rare lesions. These lesions have been depicted in textbooks on tropical medicine as elephantiasis of the scalp, face, buttock or leg.

(*ii*) *Giant urticaria* (*angio-neurotic œdema or Quincke's disease*).—One of us (H. W. A., 1925) questioned the correctness of the existing views regarding giant urticaria as a neurosis and suggested that it was due to a toxin but had no connection with the toxins in filariasis. The study of the pathogenesis of giant urticaria which was then in progress has been continued and we are now in a position to state definitely that giant urticaria is not in any way related to filariasis. This affection generally attacks the limbs, more especially the left arm, and also the face. Almost invariably the history reveals the fact that the patient has only lived for a very short time in an endemic area —a period rarely sufficiently long for the filarial infection to induce the amount of obstruction necessary to bring about this swelling of the limb. This fact is sufficient before we commence our clinical examination to eliminate the possibility of the swelling being due to *Filaria bancrofti*. Added to this, the eosinophile reaction in giant urticaria is high—generally over 16 per cent. and sometimes as high as 60 per cent.—in contra-distinction to the correspondingly low percentage found in filarial obstruction. The attack when infrequent can usually be traceable to some article of diet which is rarely eaten by the patient, such as pork, or it may occur when meat like beef is taken after an interval of several years. We sometimes see such cases amongst tea planters who for several years have lived on chicken, mutton, etc., and when they return to Calcutta and eat beef develop an idiosyncrasy towards it.

More often we find that the food producing the lesions is some common article like milk, eggs, chicken, etc., which is eaten daily and causes a persistent swelling of the limb. These patients are usually recommended by their medical adviser to live on a light diet containing only these articles; this naturally greatly increases the œdema. Such erroneous advice would not be given if the different food proteins were tested on their forearm by the dermal tests, where it would be found that the offending food produces a marked urticarial wheel. Sometimes these cases react to all the common food proteins and in these cases one usually discovers signs of intestinal stasis due to a chronic amœbic or bacillary colitis.

(*iii*) Cases of *hypopituitarism*, where generally the arms, abdomen or buttocks are affected, are commonly mistaken for filariasis. Plate II, fig. 4, is a photograph of such a case. Hypopituitarism is produced by a dysfunction of the pituitary secretion as a result of which adiposity of the tissues takes place. This may manifest itself in early life by a stunting of the growth with or without adiposity, or come on later in life with the development of marked adiposity. The latter condition is of interest to us here. Very frequently the posterior lobe is also involved so that there is a lack of pressor substances circulating in the blood; the vascular tone is not maintained and static œdema results. In time elephantiasis is produced by the growth of fibrous tissue as the result of this œdema (*see* Plate III, fig. 1).

(*iv*) *Elephantiasis nostra* is a condition brought about by streptococcal infections in puerperal sepsis, starting from a cervical tear, and extending along the lymphatics of the broad ligament to the pelvic lymphatic glands

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causing unilateral or bilateral solid œdema of one or both legs (white leg). Unilateral œdema of the leg may occur after suppuration of the deep iliac glands from septic conditions arising in the feet. Recently we had an interesting case of Raynaud's disease where attacks of secondary infection occurred in the toes and gradually proceeded up the leg producing an elephantoid condition of this limb (Plate III, fig. 2). Such cases can be diagnosed more easily in countries where *Filaria bancrofti* is not present. In the tropics when examining such a case the chances of attributing filarial origin to this condition are great if the history of the case is not taken into account. Moreover in hyper-endemic areas it is possible to get both filariasis and hypopituitarism existing side by side. Elephantiasis nostra may also affect the face and lips producing (Plate III, fig. 3) a lesion unknown in filarial infection.

(*v*) *Traumatic cases.*—It may happen that after the removal of the lymphatic glands, as for instance during an attack of plague, or as a result of injury a permanent mechanical obstruction is produced, giving rise to elephantoid swellings of limbs. The history of the case will help in the correct diagnosis of the disease.

(*vi*) *Cases of macrogymnastia* (Plate III, fig. 4) may be mistaken for elephantiasis of the breast. A careful examination with the history however reveals its true nature.

Summary.

(1) In India, filarial infections commonly occur along the coast and the course of the great rivers, except the Indus.

(2) The prevalence of this infection in these areas are determined by three factors: (*a*) A mean wet bulb temperature between 80°—82°F. with very little variation between the day and night. (*b*) Suitable Culex breeding places and the breeding coinciding with the infective season. (*c*) Density of the population amongst whom are persons carrying microfilariæ in their blood.

(3) The number of months during which all these factors coincide determines whether the area is hyper-endemic, endemic or of low endemicity.

(4) The type of lymphatic obstruction seen in these different areas varies considerably, the rough rule being that obstruction of the inguinals, epitrochlear and axillary glands are seen in hyper-endemic areas, of the iliacs and deep inguinals in epidemic areas, and of the juxta-aortic in areas of low endemicity.

(5) This knowledge can only be gained by a careful study of this disease in all these areas and not by paying flying visits during the cold weather.

(6) Continuous infection and reinfection over a long period of time is necessary before lymphatic obstruction can occur. Thus in hyper-endemic areas this latent period is about 8—10 years, in endemic areas from 15 to 20 years, and in areas of low endemicity over 25 years. This period is shortened when superimposed septic infection is present as well.

(7) The apparent immunity of the European is due to the fact that he rarely lives continuously in an infected region for so long a time; the site of his residence and the precautions taken against mosquitoes are all against heavy infection.

(8) The microfilaria is a sheathed embryo, has no power to penetrate the tissues when lymphatic obstruction is present, and cannot enter the peripheral blood—unless it comes from a non-obstructed area.

(9) Hence the rule holds good that when lymphatic obstruction occurs microfilariæ are rarely seen in the peripheral blood, and conversely when microfilariæ are seen in the peripheral blood, lymphatic obstruction is rarely seen in these cases.

(10) In chyluria, owing to the close anastomosis of the lymphatics in the region of the juxta-aortic glands complete obstruction is not possible, so that microfilariæ are usually found in the peripheral blood.

(11) In giant urticaria, the percentage and total number of eosinophiles is greater than when microfilariæ are found in the blood. The eosinophile percentage is much lower in lymphatic obstruction than when microfilariæ are present in the circulating blood.

(12) A knowledge of clinical medicine is as important as laboratory experience, as it prevents including dermatolysis, giant urticaria and hypopituitarism along with lesions due to *Filaria bancrofti.*

(13) There are many instances of lymphatic obstruction which are not due to toxins of the *Filaria bancrofti;* chyluria, hydroceles, lymph-varices, enlarged glands, or even elephantiasis of the limbs may be due to trauma or septic infections in non-filarial areas.

(14) The œdema produced by filariasis pits as readily on pressure as that due to epidemic dropsy, renal or cardiac disease.

(15) Filarial lymphatic obstruction is produced by two causes: the toxins of the *Filaria bancrofti* acting on the lymphatic vessels and glands and superimposed septic infection as the result of a lowering of the local defense mechanism, i.e., kataphylaxia.

(16) There is a definite type of lymphatic obstruction which is helminthic in origin and can be proved to be so on definite—geographical, epidemiological and pathological—evidence as due to the *Filaria bancrofti.*

(17) A knowledge of the lymphatics is essential in understanding the mechanism of this obstruction in filarial and non-filarial lesions, thus preventing gross clinical mistakes.

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RAT-GUARDS FOR SHIPS' HAWSERS.

By C. L. BILDERBECK, M.A., M.B., D.P.H.,
MAJOR, I.M.S.,
W. O. A. YOUNG, B.SC. (Lond.),
and
CAPTAIN F. H. OTTO, I.M.D.,
Bombay.

THE difficulty of mutually safeguarding ships and docks from transmigrating rats has for some time exercised the minds of Port Health Officers and Port Sanitary Authorities, and hitherto no practicable method has been devised which can be regarded as 100 per cent. efficient. One has not only to contend with the ingenuity of rats in circumventing preventive contrivances, but one also has to cope with—

(*a*) The disinterested and unimaginative work of subordinate personnel entrusted with the fixing of guards, and

(*b*) the haphazard methods adopted and lack of interest shown by ship's personnel in supervising the fixing or maintenance of such guards.

Only too often it has been shown that ships' personnel cannot appreciate the dangers run in not protecting their ships from invasion by rats from off-shore. Hence we (C. L. B. and F. H. O.) are of opinion that the only solution is for Port Health Authorities to undertake the work of safeguarding their own Ports from invasion from overseas, and—(under Article 28 of the International Sanitary Convention)—undertaking the responsibilities of preventing the export of plague-infected rats to other countries. In the East there is no doubt that this last object can most effectively be attained by continual and energetic ratting operations both within dock limits and within the town itself, but in addition to this a deterrent is required to prevent fresh arrivals off ships from overseas.

In Bombay the Port Rules require that all hawsers of ships in dock should be freshly tarred morning and evening over a length of at least 3 feet—the tarred lengths being free of ship and wharf; that the bottom of the gangway should similarly be tarred; and that a watchman should be on duty at the gangway all night. If properly carried out and if a tarry preparation of correct and lasting viscidity could be applied such measures would possibly have a measure of efficiency, but in practice one often finds that—

(*a*) A strip of canvas, tied round the hawser to a length of about a foot, or the same short length of the hawser itself, is tarred either insufficiently or with a preparation that dries too quickly.

(*b*) Even if the tarring is done according to regulations it is frequently done in a thoughtless way, e.g., tarred lengths in the case of multiple hawsers are staggered instead of parallel, thus allowing rats to cross between tarred lengths; or the tar-guard is not applied clear of the wharf and ship, so that it comes to lie on the quay itself as the tide goes out and the ship gets lower in the dock; or hawsers of different ships are allowed to cross and so allow cross-communication clear of tarred lengths.

(*c*) The gangway is not tarred at a spot sufficiently high to prevent rats from obtaining access to the ship by jumping up from the sides of the gangway, or

(*d*) The watchman occasionally leaves his watch.

Only by constant inspection can one ensure that the tarring is regularly done every evening; hence, to ensure efficiency a ready-made article independent of the personal factor should be available.

In the *Annual Report of the Medical Officer of Health to the Port Sanitary Authority, Port of Liverpool*, 1925, page 13, *et seq.* are described good models of galvanised iron disc rat-guards, 3 feet in diameter, and offering no foothold for climbing rats. In the East however these models, with one exception, would not appear to be always effective. Rats in the East can jump 30 inches vertically; hence, to be effective, the shield should be of a size approximating 5 feet in diameter, a quite impracticable and unwieldy size. Further objections to such guards are that the outward strain of multiple hawsers passing through a single guard, and the ordinary usage to which guards are subjected, soon buckle them up, and render them unserviceable. Of the models with which we have experimented the most efficient one was found to be that devised for a single hawser, with semi-cylindrical supports hinged out on either side (*vide* Plate II, fig. 1). On this guard we noted that rats were unable to obtain a sufficiently firm foothold to jump up on to the edge, but in one case we saw a rat draw back 15 inches from off the metal support, and take a clear spring up on to the rim of the guard, but when she dropped down on to the smooth curved surface of the support on the far side, she fell into the water. We suggest therefore that this semi-cylindrical support should be fitted to all guards of diameter less than 5 feet.

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In 1923, Major (now Lieut.-Col.) J. Taylor, D.S.O., I.M.S., and Assistant Surgeon G. D. Chitre, devised an electric rat-guard, described in the *Indian Journal of Medical Research*, Vol. X, No. 2, of October 1923, consisting of electrified half an inch parallel strips of aluminium on a hinged wooden triangular casing which fastened round the ships' hawser. By the kindness of Major L. A. P. Anderson, I.M.S., Director, Haffkine Institute, Parel, Dr. Chitre demonstrated this apparatus to us some weeks ago and it was found quite effective but cumbersome, being 3 feet long. When it was dry no rat was able to cross it, all being convulsed and falling off down below, but on sprinkling the guard with water, to represent local monsoon conditions, we found that the current short-circuited on the wet wood and rats were able to cross unharmed. We have therefore devised a modified cylindrical skeleton guard on reels of insulated material, whereby, even under the wettest conditions, the possibilities of short-circuit are reduced to a minimum.

The model of this (*vide* Plate I), made and considerably improved upon by one of us (W. O. Y.), is in form of a skeleton hollow cylinder, 2 feet long, designed to surround the rope or wire to which it is applied. Foundation rings of insulating material, diametrically split, are provided at the ends of the cylinder, and, on these, conducting rings are mounted in halves. Longitudinal conducting strips at a convenient circumferential pitch are mounted between foundation rings and in metallic contact alternately with one or other end ring. One or more intermediate supporting rings are introduced for mechanical strength. Flexible insulated leads are carried to the apparatus and a potential difference is maintained between the end rings by an external source of electric supply (preferably a.c.). As a warning device in case of short-circuit and to obviate consequent discontinuity of supply, a glow-lamp should be put in series with the rat-guard. The halves of the foundation rings are secured to each other by hinges which maintain electrical continuity of the end rings and by latches with a simple thumb-screw locking arrangement. The hinges of the intermediate supporting rings are insulated. The foundation rings and supporting rings are designed to destroy continuity of any water film between conductors of opposite potential.

In the latest model, spring phosphor-bronze strips 3/8 inch × 20 gauge were used for conducting elements. For quantity production, "Bakelite," "Wittonite" or other composite material capable of taking a good surface polish is recommended for foundation and supporting ring pressings.

The test model was connected through a 40 watt lamp direct to 230 volt a.c. supply with earthed neutral and was effective at 80 volts a.c. Greater safety of the public would be secured by connecting the rat-guard in the unearthed secondary circuit of a small transformer.

Where one rat-guard is used for multiple parts of rope, the ropes should be secured together at either end of the rat-guard to prevent disruption of the guard when the ropes tend to separate under tension. Suitable clamps, secured to one part of rope, may be provided for this purpose.

In practice it was found that even though rats saw their companions leaping off the guard as soon as they ran on to it, none of them tried to jump clear across it, nor, once on the electrified strips, did they seem able to jump forward on to the hawser itself clear of the guard. It would appear therefore that a rat-guard of even shorter length would probably suffice. This model cost Rs. 15 to construct but, produced in quantity, they should cost less. It is suggested that these guards when in use could be electrified from plugs on the wharf. The numbers in use could be limited by the imposition of a hire charge per guard, calculated to cover the price, replacement and maintenance costs of the guards and wiring.

Any possible danger of human electrocution could be minimised when applying the guards to hawsers by fixing the guards at a distance of about 6 to 10 feet clear of wharf and ship, and clipping or hooking in position, or otherwise fastening from above, before the current to the guards is switched on.

On 30th September, 1930, a demonstration of various kinds of rat-guards was given in the docks for the benefit of representatives of various shipping interests, and the accompanying photographs from cinema, etc., films illustrate the results obtained. Conclusions hereon must be modified by the fact that experiments were made in daylight with rats released from a trap, and therefore not altogether under natural conditions (*vide* Plate II).*

Fig. 1.—From above downwards shows a rat attempting to circumvent a Liverpool rat-guard with metal side-supports, resulting in the rat's falling off the smooth surface of the semi-cylindrical support.

Fig. 2.—Demonstrates a rat jumping up on to the rim of a Liverpool rat-guard without such side supports. Sufficient purchase was afforded by the Manila hawser for a spring up on to the edge of the guard, whence, as shown in:—

Fig. 3.—The rat was able to slip down safely on to the hawser again. This type of shield therefore does not offer the same protection as the guard depicted in Fig. 1.

* As the cinema illustrations are so small, a hand lens should be used to examine them.—EDITOR, *I. M. G.*

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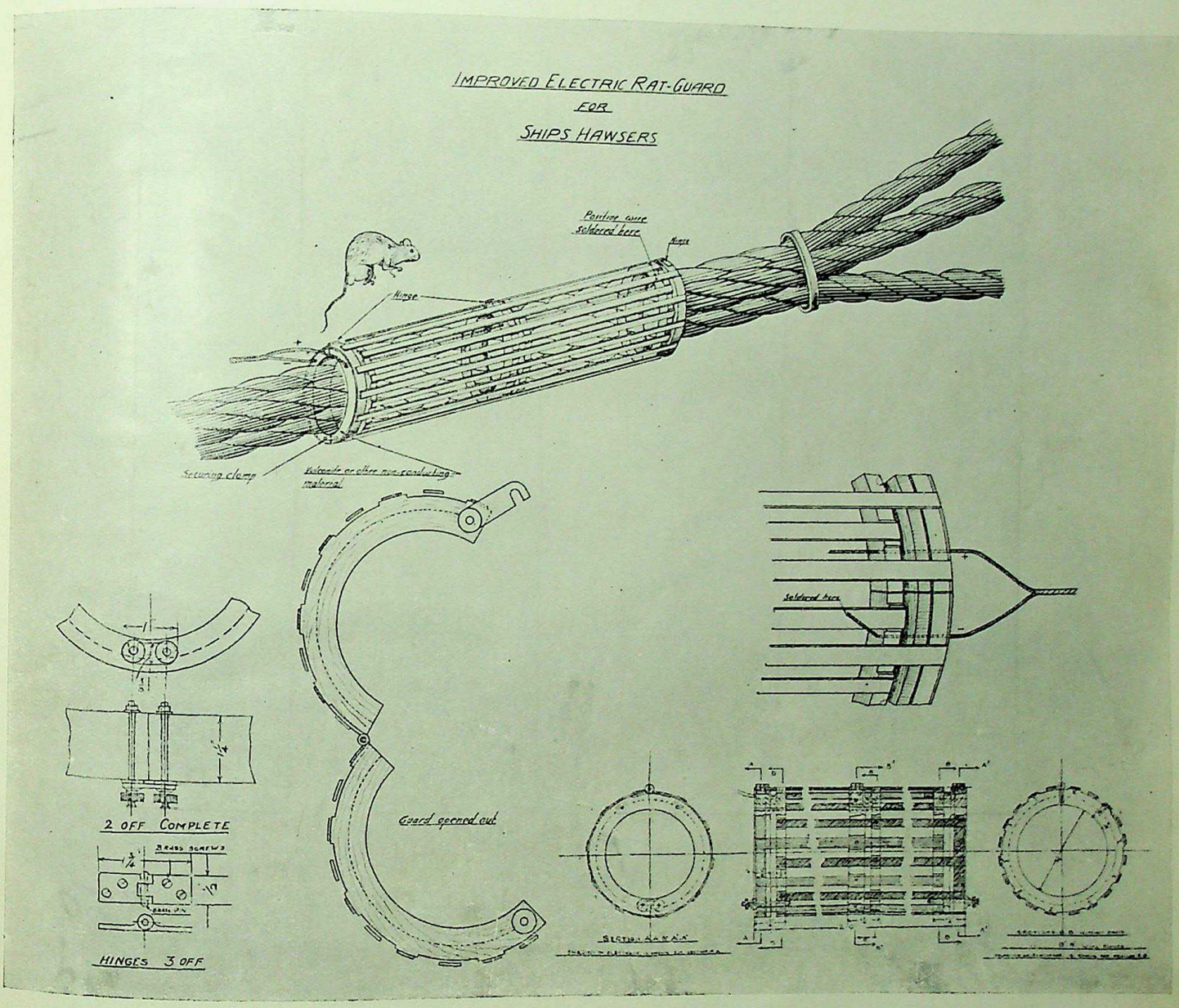
PLATE I.



Improved Electric Rat-Guard for Ships Hawsers.

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PLATE II.

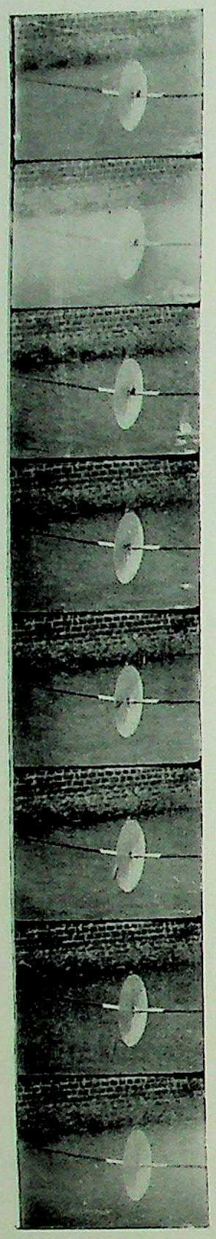

Fig. 1.

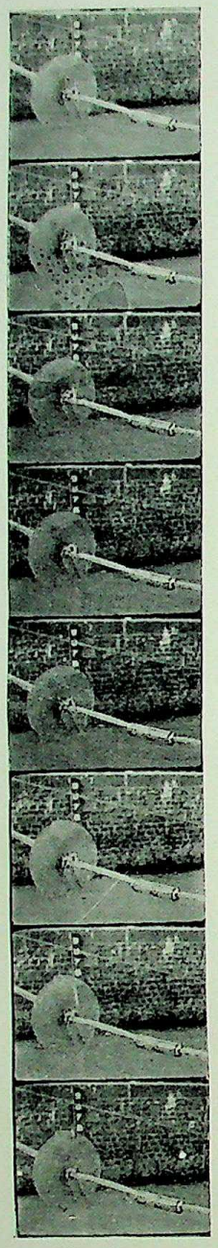

Fig. 2.

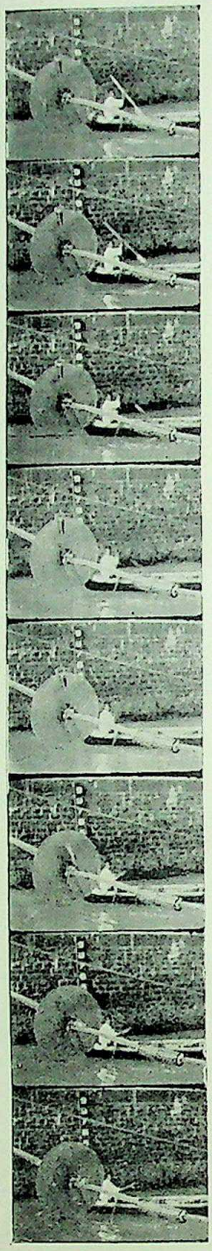

Fig. 3.

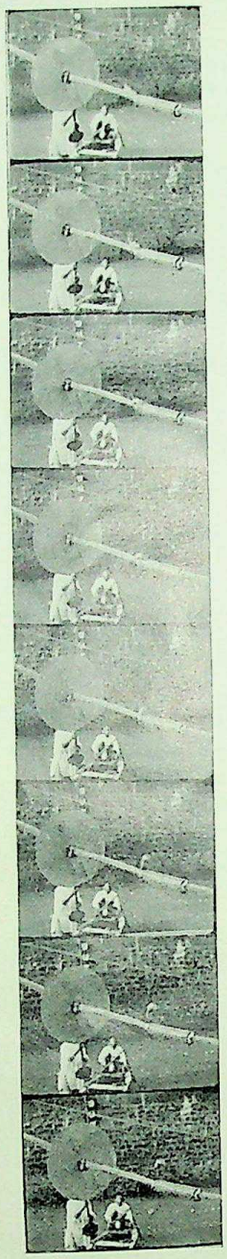

Fig. 4.

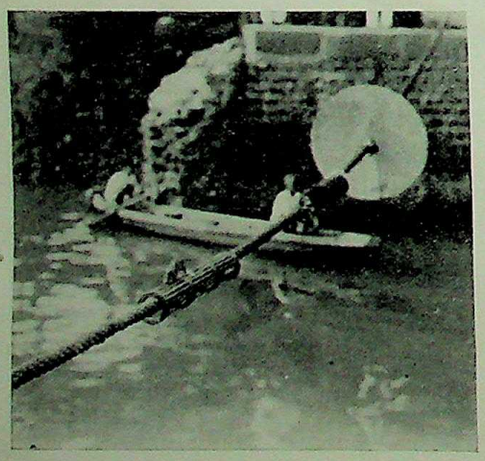

Fig. 5.

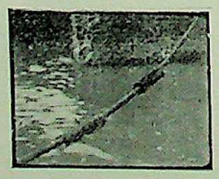

Fig. 6.

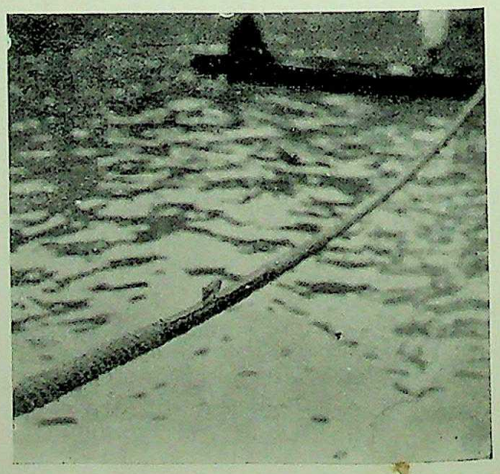

Fig. 7.

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Fig. 4.—Shows a rat electrocuted on our improved guard. The rat was allowed to cross this guard before the current was turned on. This guard is 2 feet long, but one of half this length would suffice.

Fig. 5.—Shows a rat crossing a 3 feet electric guard before the current was turned on.

Fig. 6.—Depicts the same guard together with a smooth metal cylinder tarred inside and out, over which rats ran without any hesitation or apparent inconvenience.

Fig. 7.—Demonstrates a rat crossing a freshly tarred length of hawser, which latter seemed to offer no obstruction to the rat's progress, and did not even seem to act as a deterrent, in fact only 1 rat out of 5 was sufficiently tame and fastidious to prefer to return to its cage rather than to cross the tarred length, and this was a very young female rat.

In the case of the electric guard, experiments were made with the trap dry, as also after several buckets of water had been thrown over it to represent monsoon conditions. In most instances the rats were thrown off the guard as soon as they touched it, but in 2 cases the rats ran on to the live guard, fell sideways upon it, and were so electrocuted that they fell into the water apparently dead. Of these one revived soon after immersion and the other revived later after being taken from the water where he would otherwise undoubtedly have drowned.

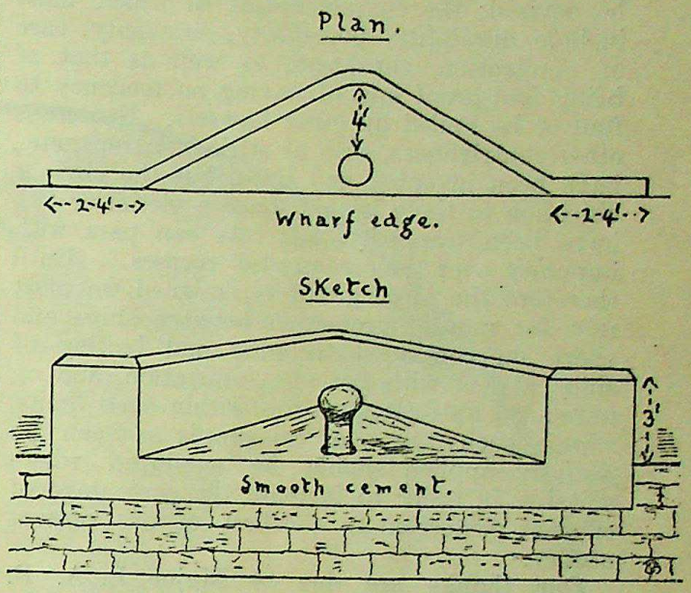
Herein lies the main deficiency in the electric guard, which, to be really effective, should be lethal; as otherwise, though this type of guard would absolutely protect ships from infestation from the shore, the shore would not of necessity be fully protected from rats off ships; for rats are expert climbers, and, rats coming from the ship having been thrown into the water from off the guard, could swim ashore and climb up the side of the wharf. This deficiency however might partly be overcome by:—

(*a*) Having a 2 feet band of smooth cement all round the wharf-facing at a height above the highest water-level. This precaution would be vitiated by the number of ladders, steps, etc., on the wharf face and by fender hawsers, though the latter could of course be fastened below the level of the cement band.

(*b*) Increasing the current so as to kill by the slightest contact, a possible procedure, but highly dangerous.

(*c*) So modifying the guard with flanges projecting slightly from the reels that there would be greater likelihood of body-contact with the live strips before the rat is jerked off the guard into the water. The objection to this would be that all such projections are liable to damage and fouling, and would make the guard more elaborate and expensive.

Elsewhere it has been suggested that further protection could be effected by enclosing all wharf bollards, etc., by a 3 feet high surrounding wall reaching to the wharf edge on both sides and set at least 4 feet from each bollard, both the sides of the wall and the edge of



the wharf below being faced with smooth cement. If properly maintained such bollard guards by themselves, though constituting an obstruction on the wharf, would protect both ships and shore but would not protect the shore from invasion by rats that fall into the water and obtain access to the wharf elsewhere. Back-springs would also still remain unguarded. Another advantage of this arrangement would be that ships would be relieved of the responsibility of affixing rat-guards on their hawsers, but such an arrangement would obstruct the movements of cranes along the wharf edges, unless the rails could be laid clear and further in-shore. Such an arrangement might be of strictly limited use for main fore and aft hawsers only, and hence at set intervals between berths.

Three further objections to the electric guard must also be enumerated, namely:—

(1) A large number of guards would be required by a large ship having many lighters moored alongside, though the rat-population on the latter would, under Article 28 of the International Sanitary Convention, have to be eliminated by periodical fumigation.

(2) When a ship is loaded the hawsers may be very short so that the electric guard might come within human reach from the wharf and the risk of electrocution be correspondingly increased.

(3) The back-springs, which run parallel with wharf and ship and therefore largely alongside the same, are difficult to protect with any type of rat-guard and offer ready access between

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ship and shore and to rats climbing from the water up the face of the wharf.

From the foregoing it is evident that, though we consider the electric guard to be an advance in local deterrents, the ideal guard has still to be devised; the characteristics of which must include durability, portability, simplicity, ease of application, cheapness, as well as that of being fool-proof and of having no tendency to foul or be fouled by other hawsers. Numerous other contrivances, such as stick-fast traps, etc., have been invented and tried, but the obvious objection to these is that, once a victim or two have been trapped, other rats can pass with impunity over their comrades' corpses. Until therefore the ideal guard is designed we must rely for mutual protection between ships and shore on continued trapping and baiting of ships at sea with periodic fumigation, and on unrelaxed anti-rat measures within dock limits, whilst such types of rat-guards as can be usefully applied should be employed where suitable in order to increase the percentage of efficient protection to the best of our present ability.

Our thanks are due to Major L. A. P. Anderson, I.M.S., Director, Major S. S. Sokhey, I.M.S., and Dr. Chitre of the Haffkine Institute for all their kindness and assistance; also to Mr. A. E. Otto, and more especially to Mr. R. D. Panvelkar, Haffkine Institute, for the excellent reproductions and admirable photographs of the above-mentioned demonstration.

A Mirror of Hospital Practice.

A FATAL CASE OF MALARIA IN A DIABETIC SUBJECT.

By ASSISTANT SURGEON B. M. DAS GUPTA,

Assistant Professor of Protozoology, Calcutta School of Tropical Medicine and Hygiene.

IT has been shown by several workers that the blood-inhabiting protozoa are largely dependent upon blood sugar for their nutrition. Thus Schern (1925), working with *T. brucei*, *T. equiperdum*, and *T. rhodesiense*, has shown that death in acute trypanosomiasis in experimental animals occurs in a condition of acute hypoglycæmia. Knowles and Das Gupta (1928) have shown that the same phenomenon holds for rats infected with *T. evansi*. Bass and Johns (1912) found that the presence of dextrose was necessary for the cultivation of the malaria parasites of man *in vitro;* whereas the same workers—(Bass and Johns, 1913)—succeeded in cultivating the parasites from a case of diabetes without the addition of sugar. Rudolf and Marsh (1927) found glycosuria in a higher percentage of cases of general paralysis treated with malaria than in control untreated cases. They also found that the titre of the blood sugar during the course of experimentally induced malaria varied inversely with the temperature chart. Hegner and MacDougal (1926), working upon infections in birds with *Plasmodium cathemerium* (*præcox*), came to the following conclusions:—

"There seems to be no doubt from the data obtained that an increase in the sugar content of the blood modifies the course of the infection, bringing about conditions favourable for the parasite and hence prolonging the infection until death results. According to our hypothesis, decreasing the sugar content of the blood should bring about unfavourable conditions for the parasite. We have attempted to do this with insulin, with suggestive—but not conclusive—results."

In a later paper, MacDougal (1927) studied the same problem in bird malaria on an extensive scale. She came to the following conclusions:—

"The conclusions reached in the preliminary work seem to be justified by more extensive experiments, i.e., that the increase of the sugar content of the blood brings about a condition favourable for the parasite in bird malaria, and a decrease in the blood sugar by the use of insulin creates a condition unfavourable for the parasite. The quantitative work, now under way, bears out the above findings so far as it has gone."

In view of these findings, it is interesting to enquire whether malaria is or is not a more severe disease in diabetic than in non-diabetic subjects. The following record of a fatal case of malaria in a diabetic subject may perhaps have some bearing on this matter. The patient was under the care of Dr. J. P. Bose and Dr. J. C. Gupta of the Calcutta School of Tropical Medicine, to whom I am indebted for details of the history.

The patient was a Hindu male aged 58 years. He was a mild case of diabetes. The blood sugar was never above 0.150 per cent. Slight dietetic modifications brought it down to a normal level. At this point he contracted a very severe infection with *P. falciparum*. Cerebral symptoms and coma supervened and despite the administration of quinine intramuscularly and as far as possible orally the case ended fatally from heart failure. Twelve hours before death the blood sugar titre was only 0.0714 per cent.

Blood films were taken early in the case, and also a series twelve hours before death. Plate I, fig. 5 shows the state of affairs in the latter films. There was present an *exceedingly* intense infection of the blood stream with *P. falciparum*, innumerable growing trophozoites and schizonts being present in the peripheral blood.

In connection with our studies on untreated cases of malaria by cultural and enumerative

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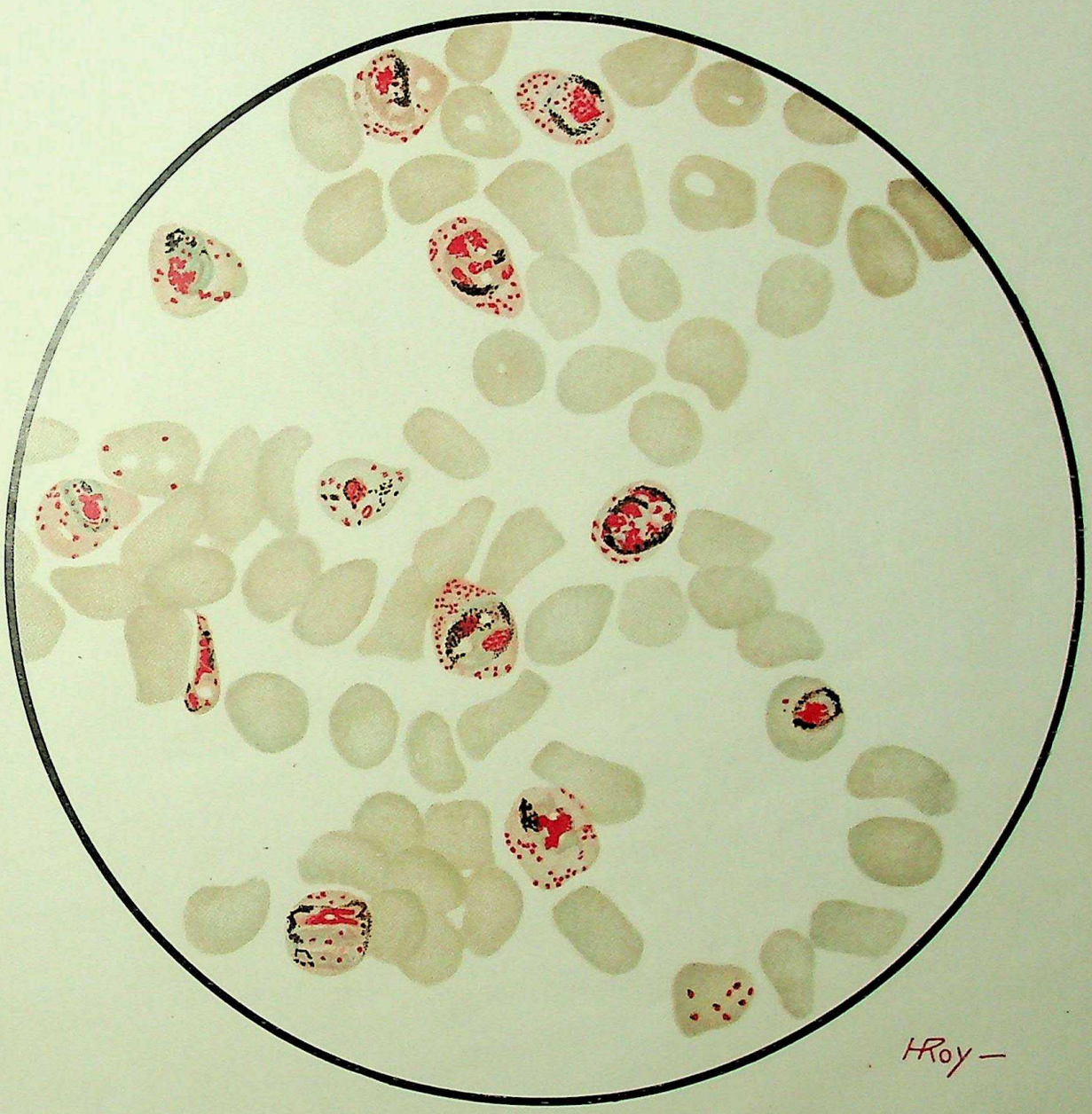
Plate I.



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methods, reported on page 1 of this issue, we have recently had a most interesting case. The patient is a Hindu male, aged 14 years, who was kept in hospital for one month, untreated, suffering from a chronic residual infection with *P. falciparum* of an afebrile character, with low parasite counts. In this patient oral administration of large doses of glucose in solution promptly brought about a febrile relapse, the number of parasites increasing at a very rapid rate and passing well above the febrile threshold for the infection. We hope to give details of this case, and of further cases studied, in a future communication.

My thanks are due to Mr. H. M. Roy, artist at the Calcutta School of Tropical Medicine, for the execution of the colour plate.

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A CASE OF GRANULOMA INGUINALE.

By M. G. RAMACHANDRA RAO, M.B. & C.M.,
Chief Medical and Sanitary Officer, Maharaja's Hospital, Pudukotah (Trichinopoly).

Previous history.—The patient, a male Hindu, aged 35 years, gives a history of venereal ulcers on his penis with subsequent secondary symptoms, which subsided after taking some native drugs.

History of present illness.—About 2½ years ago the patient noticed an ulcer on the lateral aspect of his penis. He applied some paste given by a barber surgeon, but the ulcer extended on all sides in a circular way round the penis. Within six months the ulcer had spread, involving the root of the penis and giving rise to much irritation and pain. The penis at this stage was amputated by a barber surgeon at the level of the ulcer. The ulcer did not heal, but spread upwards involving the stump of the penis left by the barber and extending towards both the groins from over the pubic region.

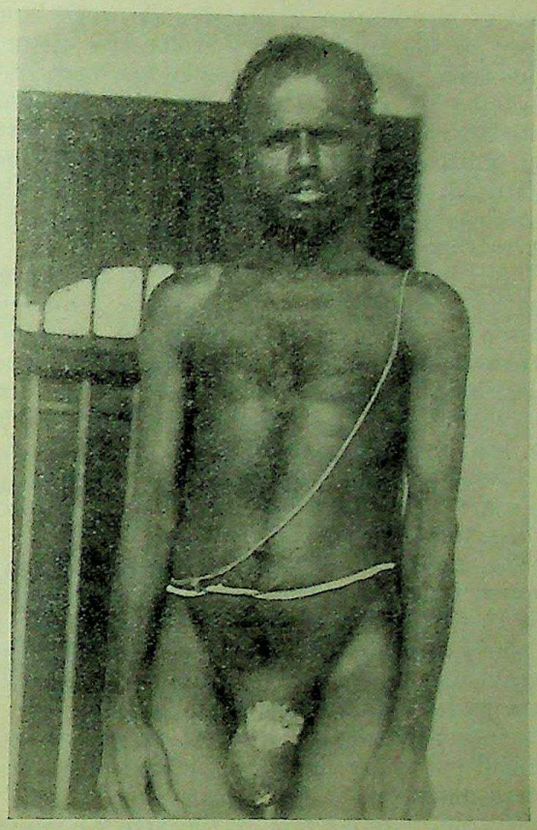
Examination.—The penis was absent and in its place there was a reddish ulcer covered with granulation tissue and with a sanious and foul-smelling discharge. It is about three inches from side to side and two inches from above downwards, situated centrally, as seen in the illustration, with a patent and pointed opening in the centre, through which urine passes freely.

The ulcer is rough, indurated, covered with angry looking granulations, bleeding profusely on manipulation. The margins of the ulcer are indurated, thickened and everted. The whole ulcer is raised above the skin level, but fixed and adherent to the subjacent tissues. The femoral and inguinal glands are enlarged.

Wassermann reaction—Positive.

Urine—Specific gravity 1005. Slightly acid, no sugar, and no albumen.

Treatment.—He was put on liquor hydrarg. perchloride m. 45, and mist. pot. iodidi. 3 oz. (1 oz. t.d.s.). Locally antiseptic dressings soaked in tartar emetic solution (½ per cent.). He had nine intravenous injections of tartar emetic



1 per cent. solution (fresh) every 5th day, starting with ½ c.c. and increasing by ½ c.c. till 2 c.c. and then ¼ c.c. to the end. The patient in all received 18 c.c. of the 1 per cent. solution. The ulcer rapidly healed and on 22nd March, 1930, the patient absconded.

EOSINOPHILIA IN DRACONTIASIS.

By J. C. CHUKERBUTI,
MAJOR, I.M.S.,
Officer Commanding, Indian Military Hospital, Ahmednagar.

I HAD the first opportunity of carefully examining blood slides of dracontiasis cases in 1927 in Mardan on the North West Frontier. I had only four cases there. Since my arrival in the Deccan District in October 1929, I have seen over 30 cases of this disease in different

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stages of its clinical history and have had their blood examined many times.

These slides were stained by the standard Leishman's method with addition of distilled water and also by the writer's "field" method without it (vide *Indian Medical Gazette* of October 1928. Both the methods of staining showed in all the cases a striking alteration of the eosinophilic nature of the granules into different shades of basophilic colour. They look every bit like eosinophiles in all other characteristics. This basophilic tendency of the granules shown by different shades of blue gradually gets deeper and deeper from the time of penetration of the stomach wall by the infective larva to the ultimate selective settlement of the mature gravid female worm somewhere in the subcutaneous connective tissue.

As soon as the worm dies in the body or is extracted by surgical procedure, the basophilic tendency of the granules diminishes in intensity, until in three or four weeks time the cells regain the normal eosinophilic nature of their granules, though their percentage remains high for two or three months.

I am inclined to think that this transformation of eosinophilic into basophilic granules is caused by the toxic stimulus of the living Dracunculus on the hæmogenetic tissues which manufacture these cells in enormous numbers, but with a powerful osmotaxis of their granules for the basic element of the Leishman's stain and not the acidic. In an established case these cells are found to constitute 10 to 20 per cent. of the total leucocytes.

The presence of these striking cells in a stained blood film from a case in any stage of this disease will greatly help the clinician both in early diagnosis and prompt treatment with intravenous tartar emetic to cut short the further journey and maturation of the worm, if this hæmatological finding is proved to be a clinical entity by more experienced observers in better positions.

Cyclops quadricornis is the general intermediary host in the Deccan, but *Cyclops bicuspidatus* has also been occasionally found to contain larvæ of *Dracunculus medinensis*.

TORSION OF THE OVARY ON BOTH SIDES.

By C. R. MANKAD, M.C.P.S. (Bom.),
Civil Hospital, Karachi.

A KHOJA lady, aged about 28 years, was admitted to the Civil Hospital, Karachi, on the 10th June, 1930, for treatment of severe pain in the lower abdomen, accompanied by a swelling in the hypogastric region.

History.—The patient got an attack of pain suddenly about a month ago when she noticed a small swelling in the right iliac fossa; the pain continued and the swelling increased to its present size during the period.

Menses regular.

Condition on examination.—There was a soft swelling of the size of a football in the hypogastric region. The patient said she had had unbearable pain in the lower abdomen for the last week. She was menstruating at the time of examination.

Immediate laparatomy was decided upon and on opening the abdomen by a right paramedian incision, the diagnosis of twisted right ovarian cyst was confirmed. The pedicle was twisted four times on itself and there was a large amount of extravasation of blood in its substance and in the lower half of the cyst wall. The cyst was removed in the usual manner.

The interesting point about this case is the fact that on examining the left ovary the following condition was found:—

The ovary was slightly enlarged and dark brown in colour. It was found after separating adhesions to the adjacent structures in which it appeared buried. On clearing away the adhesions it could be seen that the ovary had a large mesentery and this was completely twisted on itself causing partial strangulation of the ovary. After untwisting the pedicle the ovary was stitched to the posterior surface of the broad ligament.

The patient made an uneventful recovery and left the hospital on the 12th day after operation.

This note is published by the kind permission of Lieut.-Col. I. D. Jones, I.M.S., Civil Surgeon, Karachi, who operated on the patient.

AN INTERESTING CASE SIMULATING TETANUS.

By H. SHARIF, L.M.P., K.T.J. (Delhi),
Medical Officer in-charge, L. F. Dispensary, Honbal, Mysore State.

ON the 5th May, 1930, I was called to see a patient, a cooly girl on a coffee estate, aged 10. At the time of examination, the patient had all the symptoms of tetanus. The proprietor of the estate told me that the mother of the girl died two years ago, having the same symptoms. I examined the girl thoroughly, but I did not find any wound or scar on the body nor did her relatives give me any history as to the onset of the disease.

I prescribed the routine treatment for tetanus, and as there was no serum with me, I asked the proprietor of the estate to get the serum. He somehow or other did not get it. I continued the treatment on the 6th, 7th, and 8th, but the symptoms remained the same. I even tried luminal with calcium chloride, but to no purpose. On the 10th, I was told by her relatives that she passed a round worm some days ago before the onset of these symptoms. Accordingly I prescribed pulv. santonin compound on the 10th night and a purgative in the morning. She passed half a dozen round worms in the excreta and a small one through the mouth. To my surprise I found that the patient was a little better, and a week afterwards she was perfectly all right.

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A CASE OF IMPERFORATE HYMEN WITH RETAINED MENSES, SIMULATING A UTERINE TUMOUR.

By S. D. KATAREY, L.M.P. (C. P.), L.C.P. & S. (Bom.),
Medical Officer, Neemuch City.

ON the 15th August, 1930, S., a well developed Hindu girl of 16, was brought to my dispensary from a near by village, for retention of urine and severe pain of a bursting type in the lower abdomen.

The history obtained was of a very vague type, and all that could be gathered from her parents, was that the trouble commenced some 20 days previously when the patient had sudden pain in the abdomen and general malaise. Gradually, a swelling was noticed in the lower part of the abdomen, and with the increase in its size, she felt increased difficulty during micturition and lately during defæcation as well. For 24 hours prior to her admission to the hospital, she had had complete retention of urine and had had no motion for over 48 hours.

The supra-pubic region was found occupied by a hard, rounded tumour about the size of a large coconut reaching about 3 finger-breadths above the symphysis pubis and being slightly deflected to the right. It was tender on pressure and dull on percussion. This naturally led me to regard it as a distended bladder. I asked the nurse to empty the bladder and instructed her to see, before passing a catheter, if she could find out anything by making a vaginal examination. She reported that everything was very much "swollen" and that she could not make out anything. A vaginal examination by me was proposed and was agreed to.

On making the examination, the labia majora were seen apart from each other with a tough cystic tumour presenting between them, which firmly resisted the passage of the finger. At every attempt to pass the finger, it slipped into the external urinary meatus which was somewhat larger and more dilatable than usual, admitting the tip of the little finger. A sterilized metal catheter was passed in the bladder and about 20 ozs. of urine were drawn off, but there was only a slight reduction in the size of the abdominal tumour, while the one between the labia remained unaffected, nor was there any change in the pain and discomfort.

The nature of the tumour, however, still remained undetected. A finger was then passed into the rectum and showed that a hard cystic swelling was present in the region of the vagina and cervix, and was pressing on the anterior wall of the rectum. On being further questioned, the parents said that menstruation had not commenced and the girl, though married some 4 months back, was, according to the custom in their community, not sent to her husband's residence at the time of marriage nor ever since.

As her struggling would not allow me to obtain a perfect view of the parts and to make a thorough examination, she was given chloroform and put in the lithotomy position. I then separated the outer lips with the right thumb and index finger and found that the tumour was firmly adherent to and continuous with the inner lips (labia minora). Definite fluctuation could also be made out by placing one hand on the tumour and pressing over the supra-pubic region by the other.

At this stage it struck me that it must be an imperforate hymen with the menses retained behind it. I made an incision about ½ inch long at its lowest part and nearly 1½ pints of dark, thick menstrual blood were let out and with its exit disappeared the supra-pubic tumour as well. The hymen was very tough and thick, being more of a muscular structure than a mere membrane. A finger was then passed into the vagina, but no other abnormality was found except that the cervix was enlarged and patulous owing to the long retained blood and consequent stretching.

A sterilised pad with dressing was put on. After this the patient passed urine and stools quite comfortably and had no pain or discomfort of any kind. The flow continued for about two days and then stopped, after which the patient was discharged cured.

AN UNUSUAL COMPLICATION OF INGUINAL HERNIA.

By D. S. PUTTANNA, F.R.C.S. (E.),
Medical Officer, Victoria Hospital, Bangalore,
and
T. SESHACHALAM, L.R.C.P., M.R.C.S.,
Resident Medical Officer, Krishnarajendra Hospital, Mysore.

S. K., a Mahommedan boy, aged 16, has had a reducible inguinal hernia on the left side ever since he could remember. About a year ago he had a fall and hurt himself in the left groin. This resulted in a painful swelling which burst and discharged pus. Gradually the pus diminished and a swelling appeared in this region which five days before admission into the hospital became large, burst open and discharged fæcal matter. Since then he has been passing motions through the opening in the groin.

On examination there was a mass, the size of a cricket ball covered by mucous membrane which periodically discharged fæcal matter. On careful examination the mass showed two openings, through one of which fæcal matter was escaping and through the other just a little mucus. The condition was diagnosed as hernia of the mucous membrane of a cæcal inguinal hernia.

On 17th January, 1930, the abdomen was opened by a left para-rectal incision for excluding the fæcal fistula by a short circuit. The lower end of the ileum formed the afferent and the ascending colon the efferent loop. A lateral anastomosis was done between these two portions of the gut. Subsequently the patient passed fæcal matter per anum and also small quantities through the fæcal fistula. On 31st January, 1930, the mass in the groin was excised and the afferent and efferent loops closed by two layers of sutures. The wound did not heal by first intention, but the patient was discharged cured a month later.

This case is of interest on account of the cæcum forming the contents of a *left* inguinal hernia. Suppuration in the neighbourhood of a hernial sac resulted in adhesions between the sac and the contents, ulceration of the wall of the intestine and the formation of a fæcal fistula with hernia of the mucous membrane.

We have seen such herniated mucous membranes on the right side in fæcal fistulæ resulting from appendicular abscesses and many more on the left side in cases of artificial anus after resection of the rectum for carcinoma, but the hernia of the mucous membrane of the cæcum in an inguinal hernia on the *left* side is rare and is worth recording.

A CASE OF ERYSIPELAS.

By KARTIK CHANDRA BANERJEE,
Sasi Kumar Laboratory and Medical Store,
P. O. Chandijan (Durgapore), Dist. Rangpore.

CASES of erysipelas are frequently to be seen in the rural parts of Bengal. Treatment is very difficult, especially where serum and vaccines are not easily available. Tinctura ferri perchloridi, creosote, ichthyol, etc., for external

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use are advocated. I think that in simple cases they may be useful, but in complicated cases external applications seldom do good. By the use of sera and vaccines surprisingly good results are obtained. I had a few cases of erysipelas during the year, almost all of which were complicated cases. Unfortunately for me in not one single case did I get any satisfactory results by the external applications mentioned above, but had to resort to serum and vaccine. Without entering into details of all cases I will briefly cite a case which was treated recently:—

Patient, aged about 45, was a Hindu male. On 20th June, 1930, he had some ulcers in his hand and legs. He was being treated by a village quack. After 16 days' treatment erysipelas came out along with high fever. Thinking the eruption to be that of chicken-pox his friends consulted another quack, a so-called "specialist in pox," but without any result. On 18th July, 1930, I was called to see the patient and observed the following symptoms:—

The patient was in bed with violent delirium. His temperature was 97°F., his pulse was thready and quick, 105 per minute. Four ulcers were noticed on his hand and legs about the size of a rupee, swollen and offensive. The edges of the ulcers were raised and hard, the skin surface around red, tense, very painful and pitting on pressure. His face and scalp were enormously swollen. His bowels were constipated, and he passed a small quantity of urine which contain a trace of albumin.

Finding these symptoms I took it to be a case of erysipelas and prescribed as follows:—

(1) Tincture of iodine and tincture ferri perchloride in equal portion were applied to the effected parts with a bandage of absorbent cotton.

(2) All ulcers were dressed antiseptically.

(3) Quinine sulphate, magnesium sulphate, and tincture ferri perchloride were given internally, and for insomnia and delirium a sedative mixture containing chloral and bromide.

(4) For diet, milk, Robinson's barley, and green cocoanut water.

On 19th July, about 9 a.m., I visited the patient and was very disappointed at his condition. There was no sleep at night, the delirium was as before, restlessness was increased, temperature was 98°F., and the pulse and other symptoms were as before. Injection of anti-streptococcal (erysipelas) serum was given and other medicine as before.

On 20th July I found the patient better, he had had sleep at night, the toxic symptoms such as delirium, and restlessness had subsided. There was still swelling and pain of one side of the face. I thought of giving another injection of serum, but unfortunately I failed to do so. A boric compress was recommended for the affected ear.

After 4 days' treatment the left ear was again found to be swollen, the temperature rose to 100°F., and there was otitis media. I gave him a special anti-streptococcal vaccine. The affected ear was washed with "Merckozone," and boro-glycerine was put into it. A simple tonic mixture was also given. The patient was treated for another 3 weeks with the above vaccine injected twice a week before recovery was complete. Altogether 6 doses of vaccine (Bengal Immunity Co.) were required.

A CASE OF "TETANY" IN TYPHOID FEVER.

By R. C. SRIVASTAVA, B.SC., M.B., B.S.,
Roorkee.

I was called one evening to see a Hindu boy, aged 7 years, who had been down with fever for about four hours.

On examination I found that his temperature was 102.4°F., pulse 128 and respirations 29 per minute, but the most characteristic thing, which alarmed his relatives, was a peculiar painful posture assumed by his hands.

The fingers were flexed at the metacarpo-phalangeal joints and extended at the interphalangeal joints; all the fingers were drawn closely together and the thumb was crossed into the palm, thus producing the characteristic "accoucheur's position." When I tried to undo the contracture the pain increased in severity.

On examination of the lower extremities both the feet were found to be turned in and the left one was also dropped, but here the contracture was not accompanied with pain, unlike that of the hands.

I asked the patient to hold one arm vertically in the air and I noticed that this augmented the spasm in both the hands, showing "Trousseau's phenomena," but on the other hand stretching of the legs produced no result. An attempt was made to elicit "Chvostek's sign" but with negative result.

There was no spasm of the larynx.

The further history of the case went to show that it was a typical case of typhoid fever.

Treatment.—Nine grains of calcium chloride was injected intravenously at once, and calcium lactate, potassium iodide and soda salicylas (natural) was administered orally every 3 hours. The spasms disappeared within 5 hours and never appeared again though the boy has now passed the convalescent period as well. He has been taking during his convalescence parathyroid compound.

Diagnosis.—The characteristic "accoucheur's position" of the hands coupled with "Trousseau's phenomena," and the therapeutic test of the intravenous administration of calcium chloride with the subsequent disappearance of the spasm within so short an interval as 5 hours leaves no doubt as to the diagnosis of tetany. The interest of the case lies in the fact that tetany is rarely seen as a first symptom of typhoid.

A CASE OF EMPYEMA THORACIS FOLLOWING CONTUSION PNEUMONIA AND ITS TREATMENT BY ASPIRATION AND INTRAVENOUS IODINE MEDICATION.

By P. K. KURUP, L.C.P.S. (Bom.), M.R.C.P.S. (Ind.), ETC.,
Medical Officer, Taliparamba.

A FEMALE, aged 40, was admitted as an in-patient for multiple injuries on 8th July, 1930, sustained from the fall of the ceiling. The injuries were a lacerated wound of the scalp, simple fracture of the right femur, simple fracture of the 7th right rib and contusion of the right side of the chest wall. She developed contusion pneumonia complicated by purulent pleurisy of the right side. In time aspiration was done and about 12 ounces of purulent fluid was removed; the patient's condition improved. On 2nd September, 1930, finding that a sharp rise of temperature had occurred on the previous evening I gave 4 minims of tincture of iodine (B. P.) in 10 c.cms. of normal saline intravenously. There was improvement, but the hectic type of temperature continued, and 4 days later 10 minims of the tincture of iodine in 10 c.cms. of saline was given; there was further improvement in the temperature. Finding that the suppurative process had not stopped with it, another iodine injection was given on the 9th August. Paracentesis thoracis was performed again on the 12th August and iodine injection (15 minims) given on the 14th; thereafter the patient kept a continuous normal temperature and was discharged cured. The temperature chart depicts the fall of temperature after aspiration and after iodine injection.

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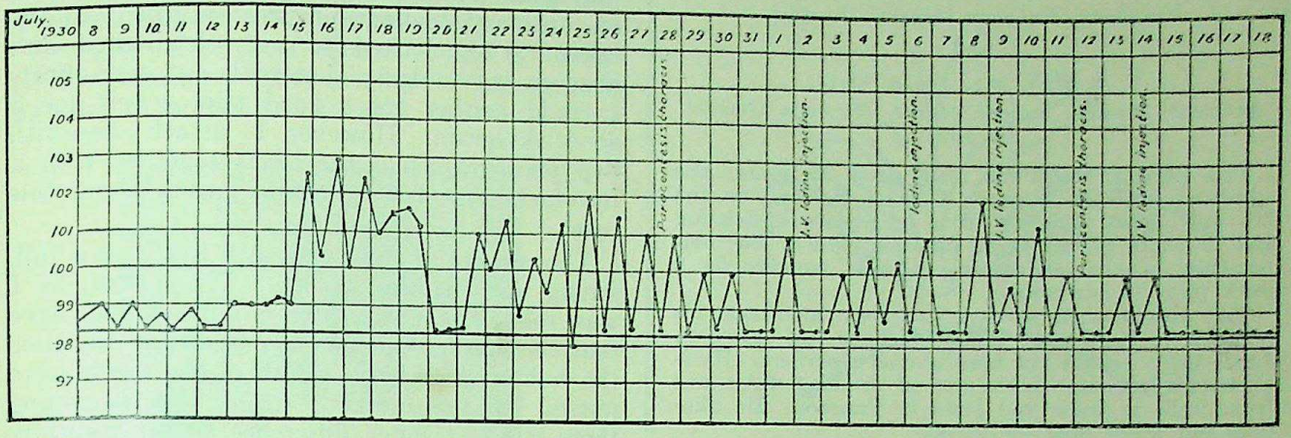
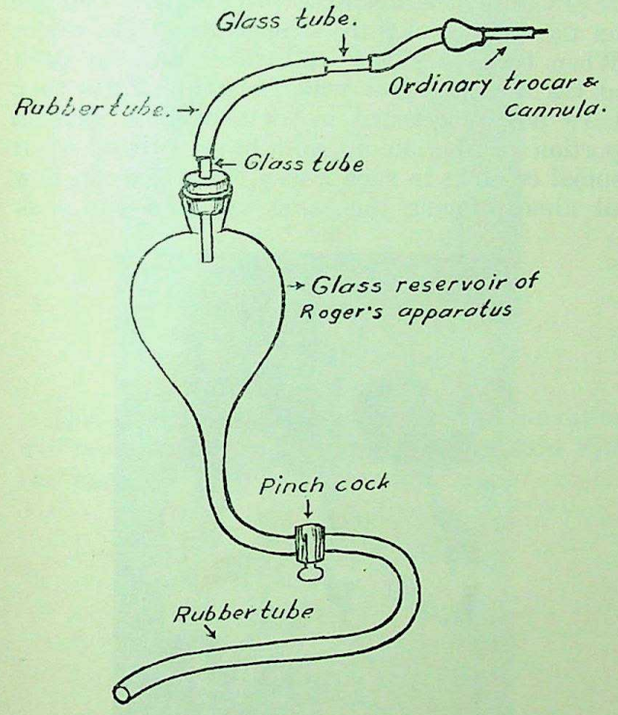
As Potain's aspirator was not available the following apparatus was devised by me and it worked very well.





Working of the apparatus.—The reservoir is filled with water and a vacuum created by emptying it by means of the pinchcock release. After puncturing the thorax as usual, take out the trocar and empty the reservoir.

Notes.

(1) In empyema thoracis following contusion pneumonia, aspiration may be tried before doing thoracotomy with drainage or resection of the rib.

(2) In chronic suppurative conditions when the patient's condition does not permit an anæsthetic for a major operation, such as in the case reported, intravenous iodine medication is of value.

(3) No venous thrombosis or phlebitis was noticed at the site of the injection.

(4) Apparatus for aspiration of the pleural cavity can be improvised with the glass reservoir of the cholera apparatus, a clip, a trocar and cannula, rubber tubing, and a glass tube. The method will be of value in outlying places where there is no Potain's or Dieulafoy's aspirator.

The improvised apparatus is not so efficient as the vacuum aspirator as there is no pump, so that the pyothorax is not completely emptied. It is, therefore, an apparatus that should only be used in an emergency.

I am aware of the just criticism that may be levelled against such treatment, but it is only a method in emergency cases where radical methods cannot be employed for various reasons.

TWO CASES OF MYIASIS OF THE SCALP.

By P. K. KURUP,

Medical Officer, Taliparamba, N. Malabar.

Case 1.—A female patient, aged 16, appeared at the out-patient department on 29th August, 1930, with a swelling of the scalp. Duration, 3 months. It was, she stated, very small in the beginning, but gradually it became as big as an areca-nut. A sensation of something crawling from within the tumour was experienced by the patient and there were occasional smarting and gnawing sensations.

The tumour was operated upon by me and it was found to be a case of myiasis of the scalp. There were a number of dead and living larvæ in the tumour which was bored in several places by the active larvæ. The swelling was devoid of skin except at its pedicle. The larvæ were sent to the Calcutta School of Tropical Medicine for identification.*

Case 2.—A patient, male, aged eight, came to me with a circular sessile swelling with a diameter of 2 inches, on the upper and posterior aspect of the scalp. The duration was one month. The surface of the tumour was excoriated, hyperæmic, and presented a few perforations of crateriform shape and in fact it had the appearance of a typical carbuncle. Operation was performed immediately and myiasis of the scalp was determined conclusively. The larvæ were small, resembled those of the previous case. In this case the swelling was sessile and that of the previous case was pedunculated; therefore both sessile and pedunculated swellings can be found in myiasis of the scalp.

This patient had a lot of *Pediculus capitis* on his head.

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* These were found to belong to the genus *Calliphora* (sp.?) (The identification of species from larvæ is very difficult.)—ED., *I. M. G.*

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A CASE OF HYDATIDS OF THE LIVER.

By R. V. MORRISON, M.D., F.R.C.P. (Edin.),
MAJOR, I.M.S.,
Physician, Rangoon General Hospital,
and
S. S. SEN, M.B., F.R.C.S. (Ed.),
Assistant Medical Superintendent, Rangoon General Hospital.

THE patient, P., Hindu male, aged 25 years, was admitted into the Rangoon General Hospital on the 7th July, 1930, suffering from progressive emaciation and ill-health of one year's duration, with a low temperature, hepatic tenderness and slight jaundice for a week prior to admission.

The patient works as clerk to a sugar merchant; his home is in Kathiawar, India, which he last visited in June, 1930; he has not been abroad elsewhere. He is a strict vegetarian; his source of drinking water was from wells in India and pipes in Rangoon. He likes dogs but keeps none.

Past history.—Patient had a similar attack of low fever about a year and a half ago.

Present history.—On admission the patient's general appearance was toxic. The pulse rapid, temperature 100.4°F. The tongue was dry and coated. The liver was palpable and tender; the spleen was moderately enlarged. Amœbic hepatitis was suspected and he was *x*-rayed; the radiograph showed that the right cupola of the diaphragm was raised and almost immobile. The blood showed a total white count of 8,000 per c.mm., and a differential count as follows; polymorphonuclears 70 per cent., lymphocytes 23 per cent., eosinophiles 2 per cent. and large mononuclears 5 per cent.

The patient was put on emetine and given 6 daily doses of 1 gr. each. As he showed no improvement and the hepatic tenderness was extreme it was decided to explore him on the 17th July. A needle was pushed into the liver posteriorly in the post-axillary line and after some difficulty clear fluid, containing a powdery sediment, was withdrawn. As little fluid could be obtained in this way a lower rib resection was performed at the same spot. As there was still difficulty in locating the fluid the liver was incised and a finger passed in. To our surprise about 50 cysts varying in size from a pea to a tangerine orange were shelled out. The parent cyst occupied almost the whole of the right lobe of the liver. Microscopically the cysts were typical hydatids with scolices complete.

The cavity was drained, but for about two weeks pieces of the endocysts continued to appear through the drainage tube. The wound then healed up and the patient has made a complete recovery.

THE MADRAS UNITED TWINS, GANGA BAI—GAURA BAI.*

By B. N. C. ROY, M.B.,
Surgeon-in-charge, Venereal Department, Carmichael Medical College Hospitals, Calcutta; Hon. Urologist, Howrah General Hospitals.

MY preliminary note regarding this case was published in the *Calcutta Medical Journal*, February 1929.

The following case of pygopagous twins was brought to my notice in January 1929. Ganga Bai and Gaura Bai were born in Madras and had attained the age of 20 years. Owing to the conservatism of the parents and the guardians of the twins no medical man had as yet had the opportunity of examining them or taking an *X*-ray picture of the case. Not even an ordinary photograph was allowed to be taken. They looked so very frightened and were so very fidgety that with my best efforts I could neither get a good photograph nor a good skiagram. However I attach herewith two photographs of the twins together with a few facts that I was able to gather about this case.

The mother of the twins, still living, is a tall, strong and healthy woman. The labour, as I was told, was practically a normal one, save that the mother became unconscious at the time the babies were born. Both of the twins were nursed by the mother. From the beginning there was not much difference, either mentally or physically, between the two sisters. The one on the right is slightly stronger than the other. When born they were attached back to back at the sacrum. But with constant efforts they have now succeeded in detaching a certain portion of the union, and have twisted their spinal columns in such a way that they can now sit almost facing the same side and can look

Fig. 1.—While standing.

in the same direction while standing. While walking one recedes when the other proceeds. During ascending the stairs one pulls with her legs and the other pushes from below. The union at the sacrum is so firm that while mounting or dismounting the stairs, more so at the curve of the stairs, one with a little bend or stoop on her body lifts the body of the other up in the air to facilitate progression. They are so very used to combined action that it is very interesting to watch their movements. There is, of course, another phase of the condition, that they are absolutely competent to do

* The history of this case with skiagram and photographs was reported at the Clinical Meeting of the Calcutta Branch of the British Medical Association, held on 15th August, 1930.

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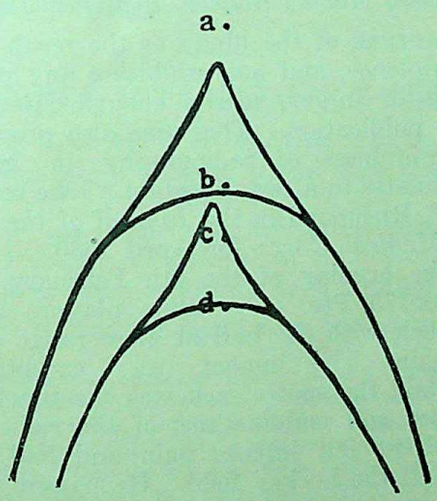
various things quite independently of each other. They do reading, knitting, etc., and can sing in a chorus. They speak fluently in two or three different languages and look in no way deficient either mentally or physically.

In spite of my best efforts I could not get a good skiagram, as the area was a big one and parallel rays had to be used.

Fig. 2.—While sitting.

The points to be noted about the condition will be clearer when studied in conjunction with the sketches attached herewith.



Sketch I.

(*a*) Junction of two anterior buttocks, which is behind (*b*).

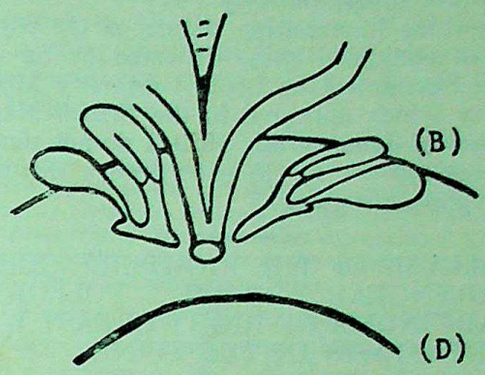
(*b*) Most anterior junctional arch of skin.

(*c*) Junction of two posterior buttocks.

(*d*) Posterior junctional arch of skin.

Between (*a*) and (*c*) are situated centrally the conjoined anus and on either side of which are the vaginal openings as is shown in sketch II.

This shows the relative positions of the united anus with the vaginal openings on either side. The two anuses have fused into



Sketch II.

one and the urogenital openings are drawn much towards the line of junction and are situated further behind than usual between the two arches (*b*) and (*d*) of sketch I. From below, one is led to think that the two pelves have fused into one cavity—a single pelvic cavity for both, but this is not the actual state of affairs.

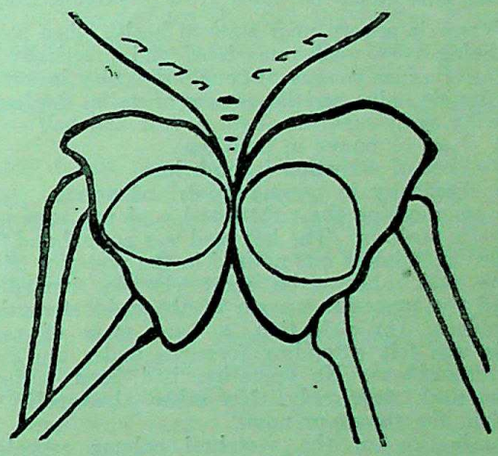


Fig. 3.

Fig. 3 gives the idea of the fusion of the sacral and the coccygeal bodies and their relation with the spinal column. The two pelves side by side and the relative positions of the thigh bones corresponding to each are shown. The anterior superior spines are very prominent.

They have a common anus, two urethras, vaginas and vulvas. The sacra of the two have fused into a central mass. There is marked scoliosis in both the spinal columns.

Both the twin sisters were nursed by their mother and were breast-fed. The right one, Ganga Bai, has been a bit stronger from birth and the left one, Gaura Bai, is only comparatively weaker. If one of them suffered from diarrhœa or colitis the other soon after felt the cramps and suffered very much in the same way; as the infection passed easily from one rectum to the other. When one got fever the

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other got it too, and that in 5 or 10 minutes time. The other could never escape. This shows the existence of ample blood communication between the two. Both of them had small-pox simultaneously.

After the illuminating lecture on the psychology of conjoined twins delivered by Sir John Bland Sutton to the Leeds University Medical Society which appeared in the *British Medical Journal* of January 5th, 1929, I do not consider it necessary for me to enter into a discussion on pygopagous twins.

PARALYSIS OF THE RIGHT RECURRENT LARYNGEAL NERVE FOLLOWING CARCINOMA OF RIGHT BREAST WITH METASTASIS IN THE SPINE.

By U. N. DAS, B.A., M.B., F.R.C.S. (Edin.),
Surgeon, Campbell Hospital, Calcutta.

A CASE of unusual interest came under my observation in February 1927. She was referred to me for difficulty of swallowing and hoarseness of voice.

A Hindu widow Mrs. P., aged 59, was operated on for scirrhus of the right breast in 1917. A radical operation with removal of axillary glands was done by Col. R. P. Wilson, I.M.S.

She was in a very poor state of health when seen by me, being very weak, emaciated and practically bedridden. Besides spasms of cough, difficulty in swallowing (liquids only) and hoarseness of voice, she had the following symptoms for about a year and half:—

(1) Loss of power in both legs.
(2) Loss of sensation in both legs.
(3) Difficulty in passing stools and urine.

On examination the right vocal cord was seen in the cadaveric position. The left cord was normal and freely mobile. A fullness was noticed in the posterior triangle of the neck above the right clavicle, immediately behind the posterior margin of the right sternocleidomastoideus. On palpation, a hard mass of matted glands was felt extending forwards under the sternocleidomastoideus. No operation had been performed on the neck previously. No other abnormality was found in the throat or nose.

Examination of the vertebral column revealed a tender swelling in the region of the lower dorsal vertebræ.

No history of trauma or previous disease in this region was obtained. An *X*-ray examination of chest and spine was suggested but unfortunately could not be arranged.

Diagnosis.—Paralysis of the right recurrent laryngeal nerve following carcinoma of right breast with metastasis in the spine.

Remarks.—A case presenting a combination of recurrent nerve paralysis and paraplegia due to metastasis in the spine following a scirrhus carcinoma of the breast is of interest on account of its rarity. Although the vertebræ are said to be one of the sites of election for secondary deposits of carcinoma in a case of scirrhus, such cases are not common in actual practice.

Dr. Logan Turner in the *Journal of Laryngology and Otology* for August 1921 was the first to draw our attention to the sequence—cancer of the breast, secondary glandular enlargement, vocal cord paralysis—and recorded six cases in all of which the vocal cord paralysis was unilateral. The homolateral cord was affected in four of the cases and the contralateral in two, both of which were right-sided scirrhus carcinomata.

All the cases had had the breast removed and the axilla cleared some time before, the average period since operation being 3½ years. These cases were referred to the specialist on account of hoarseness, and in none of them had any operation been performed on the neck. In the majority of cases the supraclavicular glands were found enlarged at the time of laryngeal palsy. The paralysis, according to Turner, is probably due to infection of the chain of glands along the recurrent laryngeal nerve in the superior mediastinum spreading in the homolateral cases from the axillary glands to the supraclavicular group, and thence to the recurrent laryngeal group. In the contralateral cases, infection spreads by superficial lymphatics from the inner segment of the breast across the middle line, and either directly over the clavicle to the supraclavicular group, or *via* the axillary glands to this group. Turner also suggested at the same time that, if systematically searched for, a laryngeal palsy would be found not uncommonly in the later stages of malignant disease of the breast. The above case demonstrates the truth of this statement.

A SUBPERIOSTEAL FISSURED FRACTURE OF THE RIGHT FIBULA.

By CAPT. A. BAYLEY DE CASTRO, I.M.D.,
Combined Military Hospital, Hyderabad (Sind).

A FRACTURE of the fibula as the result of indirect violence, and not exhibiting any pain at the seat of injury, merits enough interest to call for publication. This case also proves the great usefulness of radiography in injuries, and simulates to a certain extent a case recorded by L. F. Richmond in the *Journal of the Royal Army Medical Corps* for April 1930.

On the evening of the 5th February, 1930, No. 4966775 Pte. —— while playing hockey was struck with the ball at close range on the right shin. The impact was exceptionally severe, and the spot struck was the junction of the upper and middle third of the right tibia. The patient felt intense pain and had to be carried off the hockey field. He passed a restless night and next morning was brought to hospital.

On admission.—There was a bruise on the right shin about the location of the upper and middle third, and pain and tenderness at this spot due to periosteal inflammation. (*N.B.*—This was the spot struck.) Flexion and extension of the foot had a very short range, and were performed with difficulty and with pain, felt in the shin. All bony points were in position. Grasping the calf muscles elicited some pain, but there was no rigidity, and the temperature was the same as in the other calf. Rest in bed with cold applications was all the treatment adopted.

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On the morning of the 9th it was reported to me that the patient passed a very restless night, starting up in his sleep several times. The leg looked perfectly normal, and there was no difference in size, shape, and temperature with the other. Adduction of the foot performed by the patient caused a shooting pain, which was felt in the shin, and extension of the foot caused a similar pain. Pressure applied to the head of the fibula for the first time this morning brought about a sharp pain felt in the lower and outside of the leg. No "whip or springing" was obtainable.

Involuntary movements causing pain and night startings aroused the suspicion of a fracture, and a radiograph revealed a distinct longitudinal fissure about 4 inches long in the lower third of the fibula, occupying a rather central position in the bone.

The future progress of the case was uneventful, but the points of interest are:—

(*a*) The result of indirect violence.

(*b*) The absence of pain at the seat of fracture.

(*c*) The distance of the fracture from the spot where the opposite bone had been struck.

(*d*) The reflected pain.

(*e*) The usefulness of radiography.

Gask and Wilson state that "as a rule the presence of deformity, abnormal mobility, and crepitus, render the diagnosis easy, but with simple fissures without displacement these signs *except for localised pain may fail, and in fracture of the fibula alone the presence of the local tenderness will nearly always be the only sign.*"

I am of the opinion that the fracture being subperiosteal accounts for the lack of pain at the seat of fracture.

THREE INTERESTING CASES.

By K. S. APPU MUDALIAR, M.B., B.S.,
Assistant District Medical Officer, East Godaveri, Cocanada.

THESE are some of the interesting cases which I found on perusal of my case records which are worth reporting to a journal.

Case 1.—A male boy, aged 6 years, was brought before me.

Condition on admission.—The boy's tongue was protruding out of the mouth. It was filling the whole mouth. There was marked salivation. On first appearance, it looked as if it was a case of macroglossia. On closer examination the left half of the tongue was found to be markedly enlarged and there was a cystic feel about it. The history was that it rapidly grew to the present size in three weeks and the boy was not able to swallow anything. A provisional diagnosis of neoplasm was made and I decided to tie the lingual artery of the left side to prevent further growth of the neoplasm by cutting off its blood supply. On the sixth day after the operation, I noticed a slit-like aperture on the left side of the tongue in the prominent part of the tumour and out of the slit came an oval white cyst-like structure of the size of a hen's egg and the tongue collapsed to normal size. The slit closed up the next day and the boy made an uneventful recovery and was able to take solid food as usual by the tenth day.

I preserved the cyst for pathological examination but it was spoiled by the neglect of the assistant. I was of opinion that it was a case of *Tænia solium* or *Tænia saginata* cyst* taking into consideration the caste of the boy who is accustomed to all the varieties of flesh and there is every chance of the flesh being contaminated since they live in dirty huts and don't cook their food well.

Case 2.—A male, aged 40, appeared before me with a foul-smelling cauliflower-like growth arising from the pterygoid region of the left side and protruding out of the mouth. There was constant dribbling of saliva. The swelling was highly vascular. The submaxillary glands, submental glands and glands in the anterior margin of the left sternomastoid were enlarged.

I dissected out the submental and submaxillary glands and the glands along the anterior margin of the left sternomastoid and I tied the external carotid artery just above where it gave off the superior thyroid branch and closed up the wound of the neck. Then I slit the cheek and cauterised the base of the growth and removed it and stitched up the split cheek. The man was in a state of profound shock for 24 hours. He was given rectal feeds for 3 days, and gargles several times a day. After the third day he was given nasal feeds for another four days and the usual gargle. Later he was fed by the mouth. After 6 weeks he was able to take solid food. He was under my observation for 6 months. There was no recurrence of the growth. Then I lost sight of him.

Case 3.—A man aged 35 years was brought to my care who had a scalp injury and who was unconscious and brain matter was flowing out of the wound. Since he was unconscious no general anæsthesia was given. The entire scalp was shaved and prepared antiseptically. A circular flap was dissected under novocaine. The bone near the parieto-frontal suture was splintered and imbedded in the brain substance. The dura was torn. The bone splinters were removed carefully. The brain was gently irrigated with warm boric lotion and a small tube was put in, the rent in the dura closed by a few intermittent stitches and the flap stitched up. The man was unconscious for another 3 days, he later regained consciousness and he was not able to speak in spite of several trials for another 10 days. Later he developed speech suddenly. The tube was removed after 24 hours, the sutures were taken out after 10 days. The man made an uneventful recovery.

GANGRENOUS STOMATITIS FOLLOWING THE PUERPERIUM.

By G. H. GOKHALE, M.B., B.S.,
Bombay.

IT is generally stated in textbooks that the above condition occurs in young children living

* (Cysts of Tænia do not reach this size.—EDITOR, *I. M. G.*)

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in squalid surroundings in over-populated quarters of large cities. Therefore the following case, occurring in a female aged thirty years and living in a village, may be of interest.

The patient was living in a village with a population of eight hundred, some six miles away from the hospital. She gave birth to a child about twenty days before admission to hospital. She was admitted on 13th December, 1929, with cancrum of the left cheek. It was covered with a pultaceous slough circular in shape and about two inches in diameter. She had diarrhœa and high temperature with a pulse rate of 130 per minute. Respiratory system and the urine were normal. The slough was removed and the denuded surface was rubbed with pure carbolic acid. Iodine and polyvalent antistreptococcal serum were administered intravenously, while salol, stimulants, and fluid nourishment were given by mouth. But the patient grew worse, and died on 18th December, 1929.

The condition may have developed from the low state produced from hæmorrhage and sapræmia during the puerperium. This case shows that it may possibly follow any debilitating disease and that it can occur in adults as well as in children.

AN UNUSUAL SYMPTOM OF ROUND-WORM INFECTION.

By M. A. NOMANI, M.B., B.S. (Lucknow).

A BOY of 14 years was admitted to the wards on 7th June, 1930, with a complaint of paralysis of the lower limbs and retention of urine and fæces.

The boy after playing in the sun the whole day got high fever the night previous to admission. The parents noticed his inability to move his legs and brought him to the hospital. When I saw him he was relieved by enema and catheter.

On examining I found that the boy was of average build. He had a dull look and was not intelligent and took long to answer questions. His tongue was dry and slightly coated, and his temperature was normal. His abdomen was full and tympanitic. He could only move the toes of his left foot and that too with great effort. I was told that the knee jerk was absent when admitted, but although the limbs were loose the knee jerks were quite brisk; the plantar and other reflexes were normal. There was no twitching, etc. The urine had a specific gravity of 1025 and traces of sugar.

I thought it to be some post-febrile paralysis, when one of my colleagues suggested round-worm infection on the basis of a previous experience of such a case.

The patient was being treated symptomatically and in the night we gave a course of santonine and calomel.

The next day the patient passed two worms and showed signs of distinct improvement in the paralysis and also got control over urine and fæces. The patient was given camphor oil massage and two days later the santonine treatment was repeated.

The patient was discharged cured on 14th July, 1930.

I wish to thank Captain S. K. Chaudhuri, Civil Medical Officer, Benares State, for permission to publish this case.

ABDOMINAL WOUNDS TREATED WITHOUT DRAINAGE.

By K. C. GHOSE,

Assistant Surgeon (retd.), Monghyr.

WITH reference to Col. Brayne's article "More confidence in the peritoneum" (*Indian Med. Gaz.*, July 1930), I send herewith reports of four cases I have encountered during my 30 years' service.

Case 1.—In a rioting case, a man, aged about 45, was severely injured, and among other wounds he had a spear wound in the lower part of his abdomen extending obliquely from the right iliac region, opening the abdominal cavity and dividing the bladder at its neck, the spermatic cord on the left side, and coming out at the region of left hip. The intestines were protruding. There was no fresh bleeding when he was admitted. The intestines were cleaned and returned into the abdominal cavity, which had been mopped out. The left testis with cord was removed and stitches applied closing the wound. The neck of the bladder was also stitched. He recovered without peritonitis.

Case 2.—A man, aged about 30, was brought into hospital with a stab wound on the right side of the abdomen through which about 6 inches of intestines protruded and were covered with a piece of dirty rag. The exposed intestines were cleaned and returned into the abdomen, which had first been mopped carefully as far as possible. He made an uneventful recovery, and had no peritonitis. No drainage tube was inserted.

Case 3.—A man, aged about 35 (a workman in Jitwarpur factory), was brought into hospital at about 11 p.m. at night with a stab wound in the abdomen, coils of intestines protruding and supported by a piece of dirty rag. The wound had to be extended a little, and the intestines having been cleaned were returned into the abdomen which was mopped out as far as possible. The wound was closed; no drainage tube put in. Recovery took place.

Case 4.—A cowherd boy, aged about 10, was brought into hospital one afternoon with an abdominal wound and the intestines protruding. In the field, where he was attending his cattle, he was gored by a buffalo. The wound as well as the exposed intestines and bits of omentum were cleaned (tags of broken tissues were snipped off). The viscera were put into the abdomen and the wound closed with stitches. He recovered.

These cases are cited here from memory only to corroborate Lieut.-Col. Brayne's view and experience on the cases he treated.

[*Note.*—The experience of Col. Brayne's and that of Dr. Ghose suggest that the peritoneum can deal more easily with sepsis when it is closed and left alone than when a foreign body, which allows exudates to drain away and air to enter, is introduced. In the cases they quote the peritoneum has successfully dealt with gross contamination. We should not, however, like our younger and less experienced readers to run away with the idea that the peritoneum can be treated lightly. It is one thing to have confidence in the peritoneum when contamination has already occurred, but quite another to introduce sepsis by relaxation of the usual aseptic measures in a surgical operation. There is another side to this picture; in the history of abdominal surgery many cases of fatal peritonitis have originated from the slight degree of contamination which was brought about by a swab or instrument straying from the sterilized bowels during a "clean" abdominal operation.—EDITOR, *I. M. G.*]

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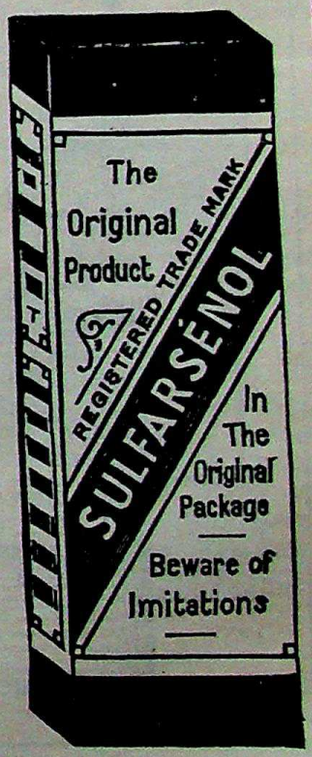

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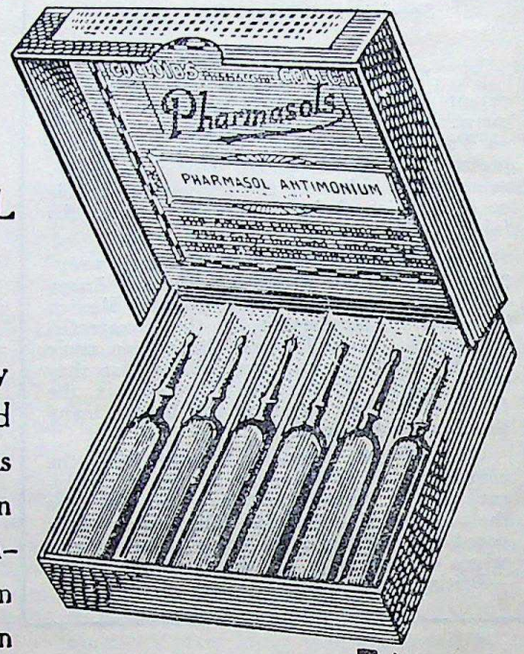

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Indian Medical Gazette.

JANUARY.

INFANTILE MORTALITY IN EUROPE.

A VERY interesting report recently published is that by the special Commission appointed by the Health Organisation of the League of Nations to report on the chief causes of still-births and of mortality in infants under one year of age in European countries.* The countries reported on were Great Britain, France, Germany, Italy, Austria, the Netherlands, and Norway, in each case typical rural and urban areas being selected by way of comparison. A uniform scheme of enquiry was adopted, and a uniform individual enquiry form issued in the language of each country concerned. The resulting data are divided into statistics for districts with low, moderate, high, and very high infant mortality.

The members of the Commission conclude that infantile mortality may be subdivided into two main groups: (*i*) still-births and miscarriages; and (*ii*) deaths during the first year of life. About 30 per cent. of the total mortality is comprised by the first group. The total mortality recorded varies from 35.6 per 1,000 live births to 197.6 per 1,000 live births, and is intimately concerned with the housing and social status of the households concerned.

In most European countries there has been a very marked falling off in infant mortality since the beginning of the present century, and especially in such diseases as digestive disturbances, infectious diseases, and respiratory diseases. On the other hand the rates for still-births—category (*i*)—have remained practically the same everywhere, and this is true even of areas where economic, hygienic, and social conditions are eminently satisfactory.

The chief point of interest in the report is that, while our knowledge of the causes of infant mortality after birth are generally known and can be combated, the factors underlying the premature and neo-natal deaths are only partly known, the chief factors at present known being syphilis, malpresentations, uterine hæmorrhage, and toxæmias in the mother. These are best dealt with by carefully pre-natal supervision of the mother. The Commission consider that there should be a great increase in ante-natal clinics, that these should be in charge of trained medical men or midwives, and that there should be much more supervision of pregnant women in industries. Overwork of the mother is a frequent cause of death of the fœtus, and financial and other measures of assistance should be provided by the State for pregnant women, such measures to apply impartially to mothers of both legitimate and illegimate children alike.

Of the infantile deaths occurring during confinement, obstetric traumatisms are largely responsible. Untrained women should be prevented from acting as midwives, and, on the other hand, the obstetrical training of both physicians and midwives should be improved. The admission of parturient women to maternity hospitals should be facilitated, and small maternity hospitals should be established in rural districts. New born infants need special care, and should not be left to the attentions of an untrained midwife. The public should be educated and midwives instructed concerning the care needed during the first hours of life by infants, especially those who are premature or feeble. Attention should also be called to the necessity for consulting doctors who have made a special study of the diseases of new born infants.

Turning to digestive disturbances in infants, the first and most important necessity is to encourage breast feeding by the mother, whether by propaganda or by means of State aid financially to her during the lying-in period. Further, the intellectual level and training of the persons in charge of the infant have a very marked effect on its welfare during the first year of life. Infant welfare agencies should be developed, and measures taken for the supervision and improvement of the milk supply. For doctors and midwives courses of training in pediatrics, and particularly in diseases of infants, should be compulsory.

Special attention should be paid to syphilis in the mother during pregnancy, and to serodiagnosis and treatment of this disease. Tuberculosis in the mother, as also heart disease, are secondary problems of importance. Whooping cough and measles in the family of the new born infant are serious causes of infection and death in the children. Overcrowding is the chief factor in the spread of respiratory diseases. "The whole of the social, hygienic and medical measures, the application of which has proved to be of such value both in preventing still-births and infant mortality during the first few days of life, and in combating digestive disturbances, acute infectious diseases, and respiratory diseases, require the closest co-operation between all the organisations concerned."

Finally, the Commission comment on the necessity for the collection of further data from all countries. It is especially the causes of neo-natal and pre-natal death that require

* *Memorandum relating to the Enquiries into the Causes and Prevention of Still-births and Mortality during the First Year of Life.* League of Nations Health Organisation. 1930. Bulletin No. C. H. 820.

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investigation, for this mortality is not controllable by the usual hygienic measures; it constitutes a special problem in itself. (The Commission in this connection do not deal with the diet of pregnant mothers, but Dr. Margaret Balfour's work in Bombay has shown this to be of great importance; a sufficiency of vitamines to the pregnant woman is essential.)

The whole report will be of interest to our readers, for the subject of infant mortality in India is of even greater importance in this country than in Europe. In a report in an early issue on the recent all-India conference of medical research workers at Calcutta, we hope to return to this subject and to outline what is being done with regard to investigation of it in India—chiefly by lady doctors under the Indian Research Fund Association.

Special Articles.

OBSTETRIC PROGRESS.
POST-GRADUATE CLINICAL NOTES.

By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P. (Lond.),
LIEUTENANT-COLONEL, I.M.S.,

Professor of Midwifery and Gynæcology, Calcutta Medical College, and Surgeon to the Eden Hospital for Women, Calcutta.

ACCUMULATED clinical observations during the last ten years' consecutive work at the Eden Hospital will, I think, be of some use to practitioners. It will be my endeavour, therefore, to speak of conditions commonly met with, but rarely discussed in textbooks.

Bowel diseases during pregnancy.

In Bengal and some other parts of India *hookworm disease* is very common. This disease, as you know, may be contracted by ingestion of the ova with food, but the main root of infection is through the skin, generally that of the feet. The infested mud lodges between the toes, thence the larvæ dig their way into the skin and eventually reach the blood stream and lungs, whence they are swallowed from the pharynx. The main symptom of hookworm disease is anæmia which may be a cause of œdema, restlessness and, at times, albumen in the urine. Such symptoms might suggest in a tropical country malaria, kala-azar, or toxæmia of pregnancy, for, as you are aware, it is no uncommon thing for many tropical diseases to be found together in one patient, but if the possibility of ankylostomiasis is borne in mind the worm or its ova will be discovered in the stool and a varying number of eosinophiles in the blood.

I have observed that there is one peculiar trait common to these patients, namely, that the skin and hair are of a peculiar dry dull appearance due to a deficiency in oil.

Hookworm disease, in some cases, is a cause of abortion, probably due to fœtal anoxæmia. In other cases the degree of dropsy and anæmia may be so great as to precipitate a wrong diagnosis such as pernicious anæmia of pregnancy or pregnancy nephritis or secondary cardiac failure. Such an error is of a peculiar importance in India where pregnancy anæmia, due to dietetic error and particularly to a lack of vitamines A, C and D in the food, is so common. For it has been established that if hookworm disease of any severity is allowed to progress undiagnosed during the latter months of pregnancy, eclampsia, secondary to the morbid conditions of the kidney and liver produced by the hookworm, may result. Rowan has published notes on nineteen cases of eclampsia in the Mississipi Valley, in whom only two were free of hookworm infection and during the last few years I have seen twelve similar cases of eclampsia secondary to ankylostomiasis. The importance of this fact cannot be overstated in Bengal and Madras where the incidence of eclampsia is so great, for it is highly probable that if the stools of every anæmic pregnant patient were examined properly, hookworm disease would be found present in a large majority and, by so doing, progressive anæmia, premature delivery, eclampsia and death of the fœtus or of the mother would be prevented by proper treatment.

As regards medication practitioners need have no fear, for my own experience, and that of clinicians in Ceylon, Italy and America bear out the fact that thymol in large doses or carbon tetrachloride or oil of chenopodium (provided the drugs contain no impurity) are not injurious to the fœtal or maternal organism. The treatment, whatever drug be used, should be repeated several times as one treatment usually fails to remove all parasites. Moreover, the thoroughness of such treatment should be checked by repeated stool examinations.

Hookworm infection is very common in the tropics; therefore it is to be hoped that the clinical picture of progressive anæmia with or without the presence of albumen in the urine will encourage practitioners to insist on proper stool examination, with a view to treatment and prevention during pregnancy.

Dysentery.

Dysentery during pregnancy is very common in India and often times its importance is not appreciated because it begins with a mild attack of diarrhœa without blood or mucus. In other cases it is thought to be of an irritative nature to start with and is treated on the usual lines but continues, with the passage of mucus and blood over many weeks. Whatever the condition, it is imperative to investigate every case, for death of the fœtus, miscarriage or premature labour and possibly death of the mother may terminate affairs. Remember that the

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stools should be examined, if possible, before treatment is begun, for if emetine is empirically prescribed it may cause abortion. For this reason I would strongly advise you to prescribe kurchi or kurchibine in *amœbic dysentery*.

The griping and tenesmus of bacillary dysentery are frequently the cause of premature uterine contractions, therefore, if saline treatment is adopted, it is advisable to give starch and opium enemata or injections of heroin to inhibit sympathetic uterine peristalsis. For this reason during the last few months we have had excellent results (after preliminary purgation) with bacteriophage given three times a day or four hourly in fulminant cases,—purchased at extremely low cost (3 rupees for 16 doses) direct from the laboratory of the Pasteur Institute, Shillong, and forwarded with full directions.

From time to time you will see cases of dysentery without fever which are progressive and accompanied with great wasting and anæmia. These cases when pregnant are perhaps the most difficult of all, for ordinary stool examination shows no intestinal parasites or any kind of protozoa and no pathogenic intestinal organisms of any kind. Moreover they have reacted to no empirical or other treatment such as diet, santonin, thymol, bismuth, emetine, calcium, kurchi, etc. What are you to do? I would suggest, as a result of much clinical experience, that these cases are similar to the gastro-intestinal upset seen in osteomalacia, in the anæmia of pregnancy, and in the rickety infant; and that it is due to a *diet deficiency* and particularly a deficiency of vitamines A, C and D together with acalcæmia; for the growing fœtus is a parasite robbing the mother of calcium for its own gain. Moreover, if you will investigate the previous diet of these patients, and can discover by examination of the blood that there is a low serum calcium and inorganic phosphate content, you will have confirmation of your diagnosis. The treatment should be proper dieting, sunlight and the exhibition of calcium. Vitamine A is contained in foods which are, as a rule, well tolerated by these patients; for instance, fresh milk, yolk of egg, raw meat juice, liver, fish roe, fresh butter, and ghee if not adulterated. Vitamine D is, as you know, supplied to man by the action of the sun's rays upon the skin, but can be given in synthetic form in the shape of Radiostoleum or Irradol and ultra-violet radiation. In the way of drugs the best results are obtained from the use of intravenous sodium morrhuate 2 c.c. on alternate days, with 2 c.c. intramuscular injections of calcium.

Occasionally sore tongue and epigastric pain with distension and palpitation of the heart and extreme nausea are urgent symptoms during pregnancy. In such a case proper dieting and a powder of five grains each of mag. carb. pond., calcium carbonate and bismuth oxycarbonate given two or three hourly will be found efficacious. Intestinal disinfectants such as mercury, Dimol and Stovarsal are of no value in my own experience.

Lastly, despite all treatment, you will, from time to time, meet with cases which persist. In such cases a really reliable laboratory worker may discover that the cause of the frequent stools, anæmia, sore tongue and prostration is due to a *streptococcal infection of the gut* which causes such changes in the gut wall as to allow the organisms to pass into the general circulation. If an autovaccine of such a streptococcal invasion can be prepared and given in addition to dietetic measures, dramatic results may be obtained.

Sprue.

This clinical condition is not at all uncommon during pregnancy and is a matter of great anxiety, for whether this disease is associated with endocrine dysfunction, acalcæmia or a streptococcus in the bowel, the clinical finding is that while the fœtus remains *in utero* the condition of the patient progressively deteriorates; moreover, the child when born is of such deficient vitality as rarely to live.

During the last year five patients have been admitted into the Eden Hospital with sprue, all of whom had been under expert treatment elsewhere. Two had premature labour with death of the fœtus, three were confined at full term. One baby was a case of large spina bifida, another was a case of incomplete ossification of the calvarium so that there was a space two to three inches wide from the nasion to the occipital protuberance, and the last case was that of complete double talipes and genu recurvatum. The mothers of these infants were pure Europeans and these findings in the children would suggest that vitamine A, C and D deficiency was, in great part, the cause and effect of the disease.

Intestinal worms.

Perhaps I should have mentioned these first, but despite their great frequency in the tropics they rarely cause serious symptoms, but from time to time you will be called to cases of abdominal pains with or without intense vomiting during pregnancy and in some patients the prostration may be so great as to alarm all concerned. Your natural instinct, in such cases, would be to think of all such conditions as pre-eclampsia, toxæmia, appendicitis or concealed accidental hæmorrhage or possibly the twisting of a small ovarian cyst, etc. But bear in mind that cold clammy prostration, abdominal pains and vomiting may be the result of acute acidosis associated with worms.

If after clinical examination you can exclude the more serious conditions mentioned above, you will gain great kudos if by santonin and

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calomel you are able to demonstrate the cause of the patient's symptoms, the acidosis of course being treated on the usual lines—alkalies and glucose by mouth and rectum, or by vein if need be, the diet being corrected afterwards.

Obstetrical pivots.

A maternity patient has to surmount four dangers as a result of her pregnancy; two occur before and two after delivery. The two before are eclampsia and obstructive labour, the two after are post-partum hæmorrhage and sepsis. Judging by hospital and consulting practice, I am of the opinion that India has still a long way to go before the importance of these four dangers is sufficiently appreciated. Ante-natal care is only in its infancy as yet and it will take years of graduate, nurse and post-graduate teaching before end results such as are being attained in Great Britain are attained in India. For instance, in the obstetric unit of the Royal Free Hospital in London, the maternity death rate for the last eight years was 2.7 per thousand cases, whereas in the Eden Hospital filtering an equally poor community the death rate per thousand was 33.6, the chief causes of death being sepsis, toxæmia of pregnancy, obstetric shock and hæmorrhage. Indeed it is safe to say that our mortality could be reduced by 80 per cent. if patients could be induced to consult adequately qualified practitioners during the carrying period.

Disproportion.

There can be little doubt that many practitioners are still in the dark as regards this subject for, although their ante-natal supervision may be lessening the complications of pregnancy, yet they still are having cases of difficult labour, failed forceps and craniotomy which could be obviated if they fully understood the subject of fœto-pelvic disproportion in its relation to the inlet, cavity, and outlet and, especially, the cervix.

There is too much slave mentality applied to pelvic measurements, and I think that the blame for such mentality amongst practitioners lies at the door of teachers and professors of both nurses and students. The question as to whether the fœtal head will descend into the pelvis and emerge from the outlet should be estimated by the Pawlik grip, the Munro Kerr and FitzGibbon manœuvres at the 37th week, and if there is doubt or reason to suspect disproportion, medical and surgical methods of induction or delivery should be seriously considered week by week. If the overlapping of the brim is more than a quarter of an inch then induction by the castor oil, quinine, pituitary technique or by stomach tube should be tried and if they fail, as possibly they may do, then the case may be permitted to go on until full term, when Cæsarean section should be done. Should, however, the overlapping with empty bowel and bladder be half an inch or more, then there can be no question that Cæsarean section is the only method of treatment. But let me say here and now that in my experience the types of case which give most trouble and doubt in private and hospital practice is not those readily-recognised or should be readily-recognised, ones of an overlapping or floating head above the brim, but those cases seen after labour has started and progressed perhaps many hours, when the head is jammed in the inlet and no advance recorded. That is a case where the cervix and cavity of the pelvis are disproportionate to the fœtus. These cases are far more common than generally supposed and only a didactic knowledge and appreciation of the vaginal findings will anticipate disaster in such cases. For instance (*i*) if the membranes bulge as a large bag into the vagina, and the cervix, although admitting two fingers, projects into the vagina as a definite untaken-up ring, you should realize that Cæsarean section is the only means for preserving the life of the baby. (*ii*) If the membranes have ruptured and the vaginal portion of the cervix is still not taken up and the head is high and does not tend to bulge through the cervix with each pain the chances of a live child delivery are small unless a Cæsarean is performed. (*iii*) If you find the cervix has reformed after rupture of the membranes and moved back into the hollow of the sacrum so that the anterior and posterior lips, thinned out, hang like a curtain in the vagina there is no doubt that Cæsarean section is the only method available.

These cases that I am speaking of are seen most often in primiparæ, but if the baby is large and unflexed, occur in a healthy multipara also. They are not so much due to a pelvic deformity as to a large head lying in a posterior position. Too often optimism actuates relatives and doctor alike, with the result that a dead baby is born and such tragedies as fistula and sepsis occur, to say nothing of death. In some cases, exasperated by delay or stimulated by relations, injections of pituitrin are given or forceps are applied only to fail with terrible tearing of the cervix. You may think I am exaggerating but I am not. During the last ten years our statistics show that we have had 104 craniotomies in such cases where the baby was dead already, and out of these 104 mothers 34 died—a terrible mortality; and if this is true of a hospital how much more dreadful must be the statistics of patients operated upon in private houses; but, I am happy to say that since I returned from America in 1925 in all such cases where fœtal heart sounds were present, however septic the patient, I have taught and performed the low cervical Cæsarean of de Lee with the result that even in desperate cases we have been able to rescue a live child and save the mother. Our statistics even in

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these bad cases are worthy of record. Dr. Dutta, my Registrar, points out that out of 75 lower uterine segment Cæsareans performed late on in labour there have been only 11 maternal deaths and 10 fœtal deaths. These statistics prove unquestionably that this operation is safer to the mother than that of craniotomy. Custom dies hard, particularly so in India, but the ease, comfort and diminished risk of the low cervical Cæsarean section is gradually spreading throughout India. Indeed, it is not an uncommon thing for a patient, Indian or European, to-day to ask for a Cæsarean section if it has been explained to them beforehand that there is a risk to herself or the baby by ordinary labour. Permit me here to repeat that practitioners and nurses should at all costs see their patients at the 37th week of pregnancy and that if they contemplate difficulty they should urge that delivery should take place in a properly equipped hospital with a surgeon in charge. I have said above that too much stress is placed upon pelvic measurements. Will you please allow me to qualify that by stating that the pelvis and fœtus of Indian patients are of different sizes and weights according to the province you are working in? For instance, I have found that the women and infants of the Punjab and United Provinces approximate to those of European standards, whereas those of Bengal, Madras and Burma are 20 per cent. smaller. This is a finding worth remembering. Moreover the head of the Indian and Anglo-Indian fœtus is more mouldable than that of the pure European, due to fundamental differences in diet of the parents from infancy upwards. The only measurements that really need careful assessment are the external conjugate, the transverse of the outlet immediately in front of the anus, and the sub-pubic angle.

Puerperal sepsis.

This condition is still the greatest cause of maternal mortality and morbidity and is responsible for four deaths out of every hundred confinements in India, whereas in Great Britain puerperal sepsis kills six per thousand, a ratio that has alas remained constant for over 20 years.

From the point of view of the tropics only education, propaganda and ante-natal supervision, together with the abolition of the meddlesome midwife and doctor can reduce the appalling death rate, but such means as the above entail immense effort by a Health Ministry permeating every district. However, now that the benefits of kala-azar, malaria and cholera units have been established it seems fitting that the whole subject of midwifery and its teaching should be taken over, along with women's hospitals by the Health or Educational authorities, aided by competent advisers. A modification of this proposal has already been adopted by Great Britain with signal results.

As I have pointed out in previous papers midwifery in Europe unaided by doctors or midwives has a very small sepsis mortality, probably not more than three per thousand, but in the tropics the parturient woman is rarely left alone. Moreover, in numberless cases, she suffers from some tropical disease, made worse by deficient vitamins in her food with the result that a fever which ordinarily would be resisted or cured by nature kills her or leaves her a permanent invalid.

Until quite recently obstetricians have been inclined to look upon cases of puerperal septicæmia, where no examinations or operative measures were carried out as cases of autogenous infection—the result of carrying streptococci in the vagina, which blazed in the presence of traumatized tissue, and in a similar manner hospital epidemics of streptococcal septicæmia were explained away; but the detailed study and investigation of these incidents by Watson in America and King in Sheffield demonstrates that the explanation lies in the attendants and not in the patient, for, it is now proven beyond all question, that if doctor, nurse or student is a carrier of streptococci in his nose or throat or teeth he or she while talking and attending the patient either at the time of delivery or shortly after may transmit streptococci to her by droplet infection with fatal results. Any one of you who has recently attended a labour case and seen the cervix red and œdematous, protruding at the vulval outlet immediately after labour, will realize how easy it is for nurse, student or doctor talking, while he or she attends the patient, to inadvertently transmit "spitlets" of streptococci on to the cervix or relaxed vagina outlet. It is for this reason that I insist on every attendant and observer of a labour case wearing a proper sterile towel mask for the nose and mouth and invariably wear one myself in private practice, for I am convinced, that by so doing we have reduced, and shall continue to reduce, the number of cases of inexplicable puerperal septicæmia.

I do not advocate rectal examination because I think the dangers thereof outweigh the advantages, nor do I think that there is any harm in three vaginal examinations if made properly with gloved fingers, because I consider the condition of the cervix and os uteri are good sign-posts in travail for both student and doctor. Indeed, I am of opinion that if such examinations were routine and made properly and not under a sari or sheet in a dark corner, many tragedies and mistakes would be obviated. For you must remember that you will rarely be called to a normal delivery, indeed, much more often the woman will have been in labour for days. It is for that reason examination is so valuable, for if you have understood what I have said under the heading of disproportion you will know how to act. For

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instance, you will tell me that you have had cases where forceps have failed and I will tell you that cases of failed forceps are the ones in which forceps should never have been applied, for high forceps or the application of forceps before the cervix is fully dilated is a crime, meaning a dead baby or a lacerated cervix or ruptured uterus followed by death of the mother in many cases. Again it is not an uncommon thing to be called to a patient who has already had pituitrin or ergot administered to her before your arrival. In such a case the size of the cervix may prohibit forceps, but the life of the mother is in danger from shock or rupture of the uterus. You will discover that the fœtal heart sounds are hardly audible and death of the fœtus is inevitable. In such a case do not attempt to deliver by the cranioclast, but perforate the skull with a pair of scissors; the brain matter will then come away and if the case is left to Nature, delivery will occur while you are treating the patient for shock.

There is just one simple point which I should like to draw attention to, and that is if any one of you are called to a patient already septic before delivery, it is a most excellent thing to stitch into the cervix a No. 12 soft catheter, which is inserted to the top of the fundus immediately after the expulsion of the placenta. This is an easy and painless procedure. Sterile glycerine is injected *via* the catheter into the uterus twice daily. By this means we have been able to save many catastrophic cases after labour and abortion.

I need not detail other methods of treatment for puerperal sepsis, for they are already in your books, but perhaps you will permit me to mention the work of Professor Mellanby, who has demonstrated that a sufficiency of vitamine A in the body and food of a patient is Nature's method of combating infection and that, therefore, if you are dealing with a case of puerperal sepsis it is scientifically rational to raise her vitamine A content by a concentrated liver diet, etc., and by giving her a teaspoonful three times a day of irradiated ergosterol which is on the market as Radiostoleum and Irradol.

Finally before we leave this subject will you permit me to remind you that the placenta is often adherent or incarcerated behind a contraction ring in the type of case which I have been speaking about. If this be so do not show any alarm or hurry, for these patients do not bleed. Make her comfortable in bed, give her morphia, and apply a tight binder over a pad for 6, 12 or 24 hours as the case may be. When she has recovered from the shock of delivery, a hot vaginal douche together with Crede's expulsion method will usually be successful, if it is not, gentle manual removal under chloroform should be undertaken. Perhaps here it would be well to remind you that inversion of the uterus though possible after precipitate labour, very rarely occurs in cases of difficult labour, far more often does it occur in patients who have had a sluggish first and second stage, the condition being originated by nurse or doctor who wrongly attempts to express the placenta in the absence of pains in a flabby woman. Inversion of the uterus occurs more commonly than you may think, and is often (when partial and undiagnosed) a cause of sudden death after labour. We have had four cases within the last six months admitted into the Eden Hospital, three of whom died within a few hours. And that reminds me that the importance of recognizing a flabby abdomen before labour is not sufficiently appreciated in India, the home of flabby muscles in middle class patients. In such a case try to bear in mind that a flabby abdominal muscle means a flabby uterine muscle and a flabby heart muscle and that every pre-natal attention should be directed to this by a full calcium and vitamine diet, by the administration of honey to raise the carbohydrate contents of the liver, heart and uterus and by giving small doses of quinine, e.g., 3 grs. twice a day to raise the contractibility of the uterus. Professor Blair Bell advises small doses of pituitrin extract for the same reason. In these patients the belly is often pendulous and therefore it is important to see that the presentation is a vertex. During labour a tight abdominal binder is useful, and when the second stage is reached there are many advantages in the patient adopting the squatting position so that the line of uterine force may be in that of the outlet, supported by the thighs of the patient. The patient should be given honey in a little milk every half hour and secondary uterine inertia avoided at all costs. Indeed, forceps early in the second stage may be advisable in order to prevent the risk of post-partum hæmorrhage and obstetric shock which are possible disasters. It is in this type of case alone when the cervix is fully dilated, that I am in favour of the administration of a pituitrin injection.

Painless midwifery.

During the last few years there has been much correspondence on this subject in lay, as well as medical journals, for, it is considered an anachronism that, despite advances in medicine, the process of parturition should still be attended with such agony. You and I are not old enough to remember the bitter antagonism of the Church to chloroform during labour, when first it was introduced by Sir James Simpson, but at least we can appreciate his argument from the Scriptures when he inferred from the book of Genesis that the Almighty intended birth should be painless. For you will remember that it is written "That the great God caused a deep sleep upon Adam, and when he was fast asleep, He took one of his ribs and filled up flesh for it and built the

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rib which He took from Adam into a woman." Anyhow the use of anæsthetics during labour was popularised when Queen Victoria summoned Sir James Simpson to give it to her during her confinements. Since those days chloroform, ether, gas, and twilight sleep have all had their adherents, but time, expense and certain complications and dangers, have limited their use. This being so, general practitioners will, I am sure, welcome a new method which we have tried out during the year in primiparæ, for it is to them that one's heart goes out during labour. This method is cheap and simple and does not entail the constant attendance of the doctor, nor has it any ill-effects on the child. It was devised by Miss Van Hoosen, M.D., of Loyola University, U. S. A., and consists of giving 1/100th of a grain of hyoscine hydrobromide every half hour for 3 doses, so soon as labour has properly started, the cervix is taken up and two fingers dilated; from then onwards 1/200th of a grain is given every two hours. In a consecutive series of fifty primiparæ we have had no trouble whatever either with the child or the mother, nor was there any post-partum hæmorrhage. I have used the method in private practice and have had equally good results. Miss Nolan, M.D., my Resident Surgeon, reports (1) that she considers this method entirely safe for both mother and baby if there is no evidence of pre-natal toxæmia such as albumen in the urine, (2) that labour is shortened considerably, (3) that it is ideal in cases where labour has been induced by the stomach tube, (4) that in 88 per cent of our cases there was no memory of labour whatever, that 8 per cent. had some memory of pain, and 4 per cent. had memory of all pains. She tells me that the only anxiety is the restlessness associated with the method in a few cases and that this restlessness although easily controllable by one or two nurses does tend, during actual delivery, to perineal tears. If this is so in private or in hospital practice a few whiffs of chloroform should be given as the head crowns the perineum. I have now seen enough of this method to convince me that it is admirably suited for the majority of primiparæ who are nervous and anxious. It is very rare, indeed, for more than six injections in all to be given and I would advise any doctor to use it if he has a good nurse in attendance, who can carry out the injections when once he has determined the stage at which to begin. It is well to warn both nurse and relatives that the patient becomes bright red in the face and "agitaté" directly after the first injection, but between the pains she is quiet and amnesic, although she may moan and talk nonsense. It is important that the nurse should pass a catheter four hourly. In a second series of 50 multiparæ we have had equally satisfactory results; the number of injections being rarely more than three.

Abdominal pains during pregnancy.

This, as you know, is a favourite examination question and I am not going to speak of such causes as pyelitis, accidental hæmorrhage, appendicitis, worms, fibroids and disease of the ovary, but rather of two conditions which frequently are unthought of or undiagnosed, the one being tetany and the other referred pain in the abdomen due to vertebral causes.

Tetany.

Tetany is much more common than you realise and may be seen in the women of all communities during pregnancy, if their diet is defective and they are anæmic. Remember that the fœtus is a parasite in the mother robbing her of calcium, phosphorus and iron, etc., for its own benefit. Normally such depletion is made good by a healthy diet and sunlight, but in the tropics a defective food supply, particularly a lack of iron, calcium and vitamines A, C and D in food-stuffs, together with the avoidance of sunlight and exercise, and the observation of *purdah* in the middle and upper classes, all combine to favour the onset of tetany, the result being that the pregnant woman suffers about the 5th month onwards from abdominal or leg cramps, syncope, headache and a peculiar inertia. Some of these patients, particularly *purdah-nashin* ones, may develop laryngeal spasm, exactly as is seen in the rickety child, and become cyanosed and unconscious. Frequently this syndrome of symptoms is not appreciated and the patient is labelled as hysteria and treated as a case of hysterical fits. In severe cases, where as a result of calcium deficiency a thin cloud of albumen is found in a non-catheter specimen of the urine, it is no uncommon thing for this type of laryngismus and cyanosis with or without fits to be diagnosed as pre-eclampsia. No greater error can be made, for if you will remember that the cause of muscular irritability or spasmophilia plus pregnancy is a part and parcel of the deprivation of the maternal blood of calcium and phosphorus, etc., you have the treatment and cure in your own hands, whereas, if no diagnosis is made, progressive anæmia may cause premature delivery and death. Although the fœtus, true to its parasitic source of life will be born apparently healthy, if immediate provision be not made to counteract its fœtal tendency to rickets it will shrivel and die. Maxwell Preston has recently amply demonstrated by radiograph and post-mortem pathological examination that fœtal rickets exists in these infants born of tetanoid or osteomalacic mothers.

The treatment of tetany is sunlight, a full calcium and vitamine diet and the giving of cod liver oil, irradiated ergosterol (Radiostoleum or Irradol) and injections of calcium.

In severe cases intravenous sodium morrhuate (Smith Stanistreet & Co.) is of great value.

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Vertebral causes.

You will have realized from what I have just said that there is a very small dividing line between tetany and osteomalacia, but what I want you to understand is that the earliest symptoms of osteomalacia are very often undiagnosed, because practitioners only think of this disease in terms of great bony deformity, whereas that crippled condition is the last stage of long standing symptoms. Twenty-five years' experience of pregnancy conditions in every community has convinced me that diet and sunlight deficiency are responsible for an ever-increasing number of obstetrical difficulties. In one type of patient the heart, abdomen and uterus are flabby and complications occur as I have told you. In another type tetany is easily demonstrated by symptoms or Trousseau's sign. In another type, that is, the one I am now going to speak about, the symptoms are apparently in the earlier stages devoted to the spine and back, and the pain is referred from the back to the front of the abdomen. Such a case may confront any one of you and it is a thousand to one that you will diagnose it as muscular rheumatism and treat it as such, but beware of so doing; for in the course of two or three months the patient may be unable to walk or sit or rise in comfort, so great will be her neuralgia. In fulminant cases actual paralysis may occur, while you are attending her, exactly as occurs in lathyrism and ergotism, which some of you may have seen in Northern or Central India; —diseases which are dependent upon degenerative changes in the nerves as a result of a toxin in peas and rye which flourishes in the body when there is an absence or insufficiency of vitamine A in the diet.

These cases of referred abdominal pain due to causes in and around the vertebral column are of extreme importance, not only because they may be found during pregnancy, but because they may occur in infancy and adolescence and then if not correctly diagnosed as due to dietetic error, may give rise to bony deformity seriously affecting parturition. Therefore should you ever see such a case bear in mind that error of diagnosis in the early stages may result later on in bone and nerve disease of severe degree. You will gain great kudos and merit in such a case if you will remember those lines of Shakespeare:—

"It is but as a body yet distempered,
Which to its former strength may be restored
By good advice and little medicine."

In continuation of the above argument, perhaps you will allow me to make a few observations on the subject of the *old multipara*—a matter of extreme importance in the East where large families still are the rule rather than the exception, for I know few of you realize the dangers associated with these cases. Because a woman has had several children without any disaster it is a common error to presume that her athletic record will continue to the end. No greater mistake can be made, for Leyland-Robinson, Menzies, and Coghlam have indubitably demonstrated that the risks of child-birth progressively increase after the 4th pregnancy. The reasons for this are that there is a pathological calcium depletion in the pregnant woman as age advances due to overwork, underfeeding and the stress of life associated with a big family. Such calcium depletion shows itself particularly in flabby uterine, abdominal, and heart muscles. Moreover in some women in this country minor degrees of osteomalacia may occur in the pelvic bones which obstruct delivery because you have relied upon her previous history of normal pregnancy, and in this false security have made no pelvic examinations. That this condition is no figment of my imagination I can prove by reference to our hospital records which illustrate the fact that there were 27 "craniotomies" out of 104 during a period of 10 years on mothers between the ages of 30 and 40, all of whom had had many children before and all of whom were admitted late in labour and already septic and with the child dead. In some of these cases the child was unduly large, in others an impacted posterior position was present, in a few the pubic rami had become beaked, and in almost all there was a history of primary and then secondary inertia associated with flabby atonic muscles which were unable to exert the necessary expulsive movement on the fœtus.

Another very important factor in the causation of disaster in the old multipara is the fact that they are more prone to the toxæmia of pregnancy, and particularly to accidental hæmorrhage, revealed or concealed, due to renal and hepatic dysfunction. For this reason these cases should always make you zealous in your ante-natal measures and careful as regards the patient's diet, her heart, her blood pressure, her urine and her symptoms, and, above all, to remember the maxim that "*Pregnancy is the most delicate test of renal function that we possess.*"

I need not recapitulate the diet, which is that outlined for tetany, but I can assure you that much can be done for these patients if seen in the last month of pregnancy by ordering them 3 grs. of quinine twice a day, or injecting half a c.c. of pituitrin twice a day with a view to increasing the muscle tone. Honey is also useful both before and during labour. You should be careful to see that there is no malpresentation, and if the abdomen is pendulous a padded binder is most useful. On several occasions rather than run the risk of intra-natal disaster and possibly post-partum hæmorrhage I have earned disapprobation by doing a Cæsarean section on such an old multipara, but it is a step that I have never regretted.

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THE SEVENTH CONFERENCE OF THE INTERNATIONAL UNION AGAINST TUBERCULOSIS AT OSLO, NORWAY.

By P. V. BENJAMIN, M.B., B.S. (Madras),*

Senior Assistant, Union Mission Tuberculosis Sanatorium, Arogyavaram, near Madanapalle.

FROM 13th to 15th August, 1930, an International Tuberculosis Congress was held in Oslo, the capital of Norway. Thirty-three countries were represented. Amongst the members were found doctors from countries as far away as Japan, the Philippines, and India. About 725 tuberculosis doctors attended this conference.

The following report deals with the subjects discussed at the conference and draws attention to what the writer considers to be of special interest for India.

Preventive vaccination.

The subject for the first day was preventive vaccination against tuberculosis. Professor *A. Calmette* of the Pasteur Institute (Paris) opened the discussion about his and *Guerin's* vaccine, usually called the B. C. G. vaccine. Hardly any question in connection with the campaign against tuberculosis has created more controversy during the last few years than this vaccine.

After about twenty years of research Calmette prepared a vaccine consisting of a culture of a living strain of tubercle bacilli of fixed characteristics and heredity, which after more than 230 sub-cultures on a glycerinated ox-bile medium was sufficiently attenuated not to produce harmful lesions in the body, yet virulent enough to act as an antigen and to produce an immunity against the tuberculous infection.

Since 1924 the B. C. G. vaccine has been extensively tried both in animals and in human beings in most of the countries in Europe and in the United States of America. The statistics published by Calmette have been subjected to the most searching criticism by *Greenwood* in England and *Rosenfeld* in Austria. *Petroff* of the Trudeau School (U. S. A.) has tried to demonstrate that the B. C. G. cultures were not so harmless as claimed by Calmette. The Vienna School has found the oral method of vaccination advocated by Calmette of no effect.

The result of the discussion at the conference was that it might be taken as demonstrated that B. C. G. vaccination produces a certain immunity, that the subcutaneous method of vaccination is more effective than the oral, and that the danger of causing active tuberculosis by the vaccine is very small; the immunity produced is neither absolute nor permanent, and persons who are vaccinated may be able to resist a mild infection with tubercle bacilli, but they may not be immune against a massive infection.

The real question whether the B. C. G. vaccination by its power of protecting against a mild infection is a better measure in combating tuberculosis than the ordinary hygienic, social and other anti-tuberculosis measures, has still to be answered. Where the last mentioned measures have proved successful when thoroughly carried out in certain countries in the West, the value of B. C. G. vaccination is not so obvious, as it does not protect against massive infection. The use of it in these countries may even give a false sense of security, and is therefore likely to do more harm than good, as the use of the vaccine might lead to the neglect of the hygienic and other anti-tuberculosis measures.

On the other hand there are countries like India where, with the best of efforts, it will take years before the anti-tuberculosis measures found effective in Western countries can take root. If the limitations of the vaccination are kept in mind, the B. C. G. vaccine will have a place, along with the other measures, in stemming the progress of tuberculosis in such countries, especially in areas where the disease is spreading and the infection is heavy.

Thoracoplasty.

The comparatively new method of thoracoplasty was discussed on the second day of the conference.

Although this operation is used only in certain chronic cases where the disease is unilateral and the lung cannot be collapsed by other methods, and although it is a serious operation, not less than 5,000 to 6,000 operations of this kind have by now been performed in the countries in the West.

Professor *P. Bull* (Oslo) who opened the discussion, referring to results obtained in Norway by thoracoplasty, was of the opinion that the operation should be performed only after careful observation in order to be sure that the other lung showed no sign of the disease. He demonstrated at the conference 30 patients operated on since 1914 and all doing full work. Amongst those who took part in the discussion was also Professor *F. Sauerbruch* (Berlin) who is the pioneer in the treatment with thoracoplasty. No one has an experience equal to his, based on 1,200 cases.

The general opinion derived from the discussion was that from 40 to 50 per cent. of patients treated with thoracoplasty returned to work, if their disease was strictly unilateral. This is a remarkable result as it should be remembered that the operation is performed only on patients who cannot improve by other treatment.

In India where a great number of patients suffering from pulmonary tuberculosis are diagnosed and treated all too late for recovery, even by artificial pneumothorax treatment or

* Dr. Benjamin, who is at present on study-leave in Europe and who attended the conference, has sent this report.

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by the phrenico-exairesis operation, thoracoplasty is an operation to which more attention ought to be given than has been the case hitherto in this country.

The teaching of tuberculosis to medical students and physicians.

The last day of the conference was devoted to the subject of the teaching of tuberculosis to medical students and to practitioners. Professor *W. His* (Berlin) basing his remarks on a large volume of evidence collected by a questionnaire spoke of the universally felt need for special teaching of tuberculosis.

The universality of tuberculous infection, the vast mortality and invalidism caused by the disease, the varied nature in which the malady manifests itself, the advances made in its treatment during recent years, demand that tuberculosis ought to be included as a special subject in the curriculum of medical studies, taught by one who has had the necessary practical experience. It was strongly pointed out that the teaching ought to include practical demonstration in tuberculosis dispensaries and sanatoria. The teaching of tuberculosis in a general hospital clinic alone cannot be considered satisfactory. In several of the Western countries, e.g., Germany, Norway, Sweden, Canada and Scotland, special provision is made for teaching tuberculosis to medical students.

Equally important was the recognition of the need for provision of post-graduate training in tuberculosis for doctors in general practice. It was pointed out that a doctor with a knowledge of tuberculosis learned ten years back would be to-day completely out of date. In fact practically every country in the West has provision for post-graduate teaching in tuberculosis. In Canada several sanatoria are equipped for teaching, and some of the insurance companies partly finance the scheme. In Denmark post-graduate courses in tuberculosis are organised for doctors who are appointed as district medical officers. The national tuberculosis associations of France, Italy and Norway give special scholarships for doctors for post-graduate study. Similar arrangements exist in Finland, Holland, Austria and Poland.

In India tuberculosis has to be recognised as one of the principal diseases and one which is becoming even more serious owing to its spread in districts hitherto lightly or not at all infected. Side by side with this exists a deplorable lack of knowledge of the diagnosis and treatment of tuberculosis among general practitioners. This probably has its origin in the lack of opportunities for adequate practical observation of patients in special tuberculosis institutions in or near university centres. The lack of facilities of this nature tends to minimize the importance of tuberculosis and to make the teaching of the subject very difficult.

Considering the seriousness with which the teaching of tuberculosis is taken up in the West, India cannot afford to be behind in the provision of special teaching in tuberculosis.

Medical News.

FACULTY OF TROPICAL MEDICINE, BENGAL.

AT the examination for the License in Tropical Medicine, Faculty of Tropical Medicine, Bengal, held in October 1930 at the conclusion of the short term class at the Calcutta School of Tropical Medicine, the following 35 out of 48 candidates passed. The names are placed in alphabetical order:—

Manindra Nath Bhattacharjee, L.M.P., Attending Physician, Purulia Medical Hall.
Rukmini Kumar Bhattacharji, L.M.P., Medical Officer, Isabhul Tea Estate, Sylhet.
Eleanor Martha Bohnsack, M.D., Medical Missionary, North Arcot.
Shiba Narayan Brahma, L.M.P., Doctor under Balasore District Board.
Jnanesh Chandra Chakravarty, L.M.F., Assistant Medical Officer, Out-door Leper Dispensaries, Calcutta.
Vallabh Das Gupta, L.M.P., State Doctor, Dhar State.
Sasi Sekhar Dutta, Sub-Assistant Surgeon, Railway Board.
Ramkrishna Mukund Huddar, L.M.P., Assistant Medical Officer, Government of Central Provinces.
Edward Charlton Hudson, M.B., B.S., M.R.C.S., L.R.C.P., Medical Superintendent, Santal Mission Hospital.
Venkatarama Sankararama Iyer, L.M.P., Government of Madras.
Mohamed Jalal-ud-din, M.P.L., Government of the Punjab.
Anant Ram Kapur, L.S.M.F., Medical Officer, In-charge of Dispensary, Hissar District.
Inayat Ullah Khan, L.S.M.F., Sub-Assistant Surgeon, Government of the Punjab.
Jainarain Mathur, L.M.P., Sub-Assistant Medical Officer, B. B. & C. I. Railway.
Kantilal Ramprasad Mehta, L.C.P.S., Sub-Assistant Medical Officer, B. B. & C. I. Railway.
Khan Mohammad, L.S.M.F., Medical Officer in-charge of Rural Dispensary, Biwan, Gurgaon District.
Aditya Ram Ojha, Assam Medical Examination Board, Sub-Assistant Surgeon on Kala-azar Duty.
Khanderao Ganesh Pradhan, Assistant Medical Officer, Government of Central Provinces.
Syed Abul Ala Fazlur Rahim, L.M.P., Sub-Assistant Surgeon, Government of Bengal.
Daulat Ram, M.P.L., Sub-Assistant Surgeon, Government of the Punjab.
Gummulury Ramamurti, L.M.P., Government of Madras.
Sain Das Rampal, L.S.M.F., Sub-Assistant Surgeon, Government of the Punjab.
Dinesh Chandra Ray, L.M.F., Sub-Assistant Surgeon, Government of Bihar & Orissa.
Murari Mohan Roy, L.M.F., Medical Officer, Omargaon Dispensary, Howrah.
Naresh Chandra Roy, Sub-Assistant Surgeon, Government of Assam.
Lakshminarayana Rudrabhatla, L.M.P., L.C.P.S., Private Medical Practitioner.
Aga Mohamed Shirazee, L.M.P., Private Medical Practitioner.
Balwant Singh, L.S.M.F., Sub-Assistant Surgeon, Government of the Punjab.
Gurkirpal Singh, I.M.D., Government of India.
Sher Singh, L.S.M.F., Government of the Punjab.
Eileen Spencer Morris, M.B., B.S., Government of India.
Gadepally Subbarayudu, L.M.P., Government of Madras.
Gopi Kishor Thakur, L.M.P., Medical Officer, District Board, Birbhum.

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Kaung Mra Thu, L.M.P., Government of Burma.
Sankar Vishnu Velankar, M.B., B.S., Private Medical Practitioner.

BOMBAY MEDICAL COUNCIL.

THE following summary of the proceedings of the meeting of the Bombay Medical Council held on the 15th September 1930 is published in the Press for information.

1. The Council held a formal enquiry into the case of Mr. Shripad Narhar Kulkarni, M.B., B.S., registered as of Hubli, Dharwar District, who had been summoned to appear before the Council on the following charge, viz.:—

That on or about the 12th March 1930 without having previously had one Rachangauda Rudragauda of Sulla village, Hubli, under his treatment or observation he gave him or some person on his behalf a certificate to the effect that the said Rachangauda Rudragauda was under his treatment from the 11th March 1930 for acute dysentery and had been advised to take complete rest in bed for a fortnight, which certificate was false to his knowledge and that he gave such certificate for the purpose of making it possible for the said Rachangauda Rudragauda to obtain an adjournment of a criminal case in which he was the accused, and that in relation thereto he had been guilty of infamous conduct in a professional respect.

The Council held that the above facts alleged against Mr. Shripad Narhar Kulkarni had been proved to their satisfaction, but judgment was postponed, the Council directing that the case be adjourned to the Sessions of September 1931.

2. The Council considered a correspondence between the Government of Bombay and the Government of Portuguese India, showing that the latter was not prepared to accept for registration in Portuguese India all the qualifications mentioned in the schedule of the Bombay Medical Act, and resolved to address the Government of Bombay with a view to the Government of Portuguese India being moved to accept for registration the qualifications granted by the medical institutions in the Bombay Presidency only, as described below:—

(1) Doctor, Bachelor and Licentiate of Medicine and Master, Bachelor and Licentiate of Surgery of the University of Bombay;

(2) Fellow, Member and Licentiate of the College of Physicians and Surgeons of Bombay;

(3) Any person trained in a Government Medical College or School in the Bombay Presidency who holds a diploma or certificate granted by Government declaring him to be qualified to practise Medicine, Surgery and Midwifery, or to be qualified for the duties of a Military Assistant Surgeon, Hospital Assistant, or Sub-Assistant Surgeon; clause (3) being subject to the provisions of the Indian Medical Degrees Act 1916, i.e., that none of these qualifications shall be registrable if obtained after 1916.

3. The Council considered a suggestion made by Mr. R. H. Desai, L.C.P.S. of Nadiad, that the Diploma of L.T.M. granted by the Calcutta School of Tropical Medicine and Hygiene be recognised for registration as an additional qualification under the Bombay Medical Act, and resolved to inform Mr. Desai that the suggestion could not be accepted.

4. The Council considered an application from Mr. Nariman Nasarvanji Karani, L.M.S., for the removal of his name from the Bombay Medical Register. The President acting under rule 70 having put from the Chair the question whether the Registrar shall erase the applicant's name from the Register, the answer of the Council was in the negative.

5. The Council unanimously agreed to the re-appointment of Mr. Joseph Bocarro as Registrar for the year beginning on the 1st November 1930.

MEDICAL PRACTICE IN PERSIA.

WE have been asked by the Deputy Director-General, Indian Medical Service, to bring to the notice of our readers the conditions which obtain at present with regard to medical practice in Persia. The British Ambassador at Teheran, in forwarding the regulations laid down by the Persian Government to the Secretary of State for Foreign Affairs, comments on "the increasingly obstructive tendencies of Persian officialdom," and expresses a desire that all doctors who wish to practise in Persia should be made fully aware of the regulations involved. These are set out in his official circular letter No. 64 of date the 16th October 1930, of which the following is a copy:—

British Legation,
Teheran,
October 16th, 1930.

Circular No. 64.

Sir,

With reference to my circular despatch No. 19 of April 17th, 1929, I have to inform you that foreign doctors who require licences to practise medicine in Persia, and to import dangerous drugs, must now submit the following documents to the Persian Ministry of Education:—

1. A written application, preferably in Persian.
2. Original diplomas, authenticated by a British Consular Officer in the case of doctors already in Persia. In future the diplomas should be authenticated by a Persian Consul in the country of issue.
3. Two certified copies of the diplomas.
4. Two certified translations of the diplomas.
5. A certificate of identity with photograph, giving full particulars of the applicant's nationality and place and date of birth, and the number, place and date of issue of his passport.
6. Two photographs endorsed by the applicant.

You should bring these requirements to the notice of all persons concerned, and particular attention should be directed to the second paragraph.

I am, Sir,
Your most obedient servant,
(Signed) R. H. CLIVE.

To His Majesty's Consular Officers
in Persia.

THE KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND.

THE Honorary Secretary of the Indian Red Cross Society has asked us to publish the following press communique with regard to this fund:—

It will be recalled that at the annual meeting of the Indian Red Cross Society held at Viceregal Lodge, Simla, in June last, His Excellency the Viceroy made the following announcement regarding the allocation of this Fund:

"The fund for which as you know I appealed last year to commemorate His Majesty the King's recovery from serious illness has now been closed and amounts to something over 9½ lakhs of rupees. I have received a large number of valuable suggestions as to the allocation of the fund, and some time ago I appointed a small Central Advisory Committee including among others the Hon'ble Member for Education, Health and Lands and the Director-General of the Indian Medical Service to advise me as to the merits of the various schemes submitted. After the fullest consideration, this Advisory Committee recommended that, with the funds at our disposal, an anti-tuberculosis scheme is one that is most likely to be of real service to the people of India. The best means of relieving suffering is by prevention of disease, and the best means of preventing disease is by education directed towards the causes of disease and the methods by which these causes may be removed. The scheme of which the Committee have drawn up an outline is therefore concentrated on the official and non-official opinion in the different Provinces.

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I have decided that a scheme of this character would meet with the most general approval throughout India. Some of you may remember that at our general meeting last year I announced that Sir Bhupendranath Mitra had offered the assistance of the machinery of the Red Cross Society in administering the Thanksgiving Fund, and I have ascertained from those now in authority that the Society will be ready to administer the scheme we have now decided upon. The King has been graciously pleased to approve our proposal, and I think we may congratulate ourselves both on being able to provide the Red Cross Society with funds for a much needed campaign and on the good fortune of having such an efficient organization to administer the scheme."

In the detailed scheme to which His Excellency referred briefly above, it is recommended that efforts should be concentrated on the prevention of tuberculosis, and that the fund should be devoted to:

(*a*) The technical side of the work; e.g., demonstrations in hospitals, lectures to medical practitioners and students, organisation of popular lectures through local bodies or Public Health Departments, the establishment of relations with the existing tuberculosis hospitals and institutions and rendering help to them by visits and advice.

(*b*) Propaganda, through pamphlets, leaflets, charts, etc., in different vernaculars, and through lantern slides and cinema films, etc. Dissemination of propaganda to be made through voluntarily constituted Provincial Committees or failing such Committees through Local Governments and local bodies.

(*c*) A survey of such parts of India as present abnormal conditions, with the object of collecting information regarding the prevalence of the disease.

His Excellency the Viceroy, in accordance with the above announcement, has now handed over the Fund to the Indian Red Cross Society for administration, and a special Committee, with the Hon'ble Khan Bahadur Mian Sir Fazl-i-Husain, K.C.I.E., *Kt.*, as Chairman, has been appointed by that Society to carry out the proposed scheme. The post of Organising Secretary of the anti-tuberculosis campaign contemplated is being advertised in the leading newspapers and medical periodicals of India and Great Britain, and it is hoped that the appointment will be filled by the end of the year.

In order to avoid disappointment, it must be clearly understood that only the income from the capital investment of the Fund will be available for educational and propaganda work against tuberculosis, and that the proposed scheme does not contemplate in the first instance money grants to individual institutions caring for the tuberculous. It is hoped that the Fund will form a nucleus which will be augmented by donations and subscriptions earmarked for anti-tuberculosis work, and that this act of commemoration of the recovery of His Majesty the King-Emperor from serious illness may prove the first step in a widespread campaign to prevent the spread of the tuberculosis scourge in India.

Current Topics.

A Fatal Accident with the Diathermy Apparatus.

(Abstracted from *The Lancet*, Vol. CCXVIII, 12th April, 1930, p. 828.)

A FEW weeks ago public attention was aroused by an accident which caused the death of a well-known physician specialising in electrotherapy. The physician was seen by a servant when he was standing in front of the apparatus, the lid of which was open, with both his hands inside the machine making some adjustment. Suddenly she saw a bunch of sparks darting from the apparatus, heard a scream, and saw her master fall to the floor. She ran to him and screamed for help, but some time elapsed before anyone came to the scene of the accident. Even when medical help was procured, it was first thought that the physician, who had suffered from heart trouble, had had an attack of angina pectoris; thus valuable time was lost before artificial respiration was instituted. When the real cause of the accident became evident it was too late. Subsequent investigation showed that the physician had been the victim of his own insufficient precautions. He had a pair of indiarubber shoes on his feet and indiarubber gloves on his hands, but these latter were not in perfect condition. He had evidently switched on the current whilst working on the apparatus, in the attempt to find the origin of a fault in the machine, believing that he had insulated himself. The unfortunate physician met his death only because he unscrewed the lid of the machine and meddled with the fittings without turning off the current of 220 volts which passed through his body. This is the first instance on record of death caused through the medical diathermy set.

Fatal Dermatitis Following the Use of Iodine Spirit Solution.

By R. CHARLES ALEXANDER, M.B., CH.B., F.R.C.S. (Edin.).

(Abstracted from *British Medical Journal*, 19th July, 1930, p. 100.)

FOR some twenty years solutions of iodine in spirit of varying strength up to 5 per cent. have been in use for the preparation of the skin preliminary to surgical operation. While a certain amount of skin irritation has been noted in a few cases, there would seem to be no record of a fatality occurring from the use of such a solution, and an account of the course of a case where death followed its use seems worthy of publication.

A married woman, aged 37, was admitted to my wards in Dundee Royal Infirmary, on the recommendation of Dr. G. F. Whyte, for the radical cure of a femoral hernia. There was nothing unusual in the clinical features of the case, or in the account given by the patient of her previous health. Fifteen years previously she had been operated on by another surgeon for acute appendicitis, but no information is available as to the method of skin preparation employed at that time.

The routine skin preparation then employed in my clinic was that on the day previous to operation the skin of the operation area was shaved; the part was washed with ethereal soap and water, dried with a sterile towel, painted with surgical spirit, and, when that had dried, it was painted with a 2½ per cent. solution of iodine in spirit. When this had dried the part was covered with a sterile dressing retained in place by a bandage, this preparatory dressing being removed on the operating table after anæsthesia had been induced, and just before the final preparation of the operation area, which, in a clean case, consisted of the application of a single coat of the 2½ per cent. iodine solution with a gauze pad held in forceps by the surgeon or assistant. The solution kept in the theatre for this purpose is stored in a coloured glass bottle with a glass stopper; sufficient for use in each case is poured into a sterile enamel dish, a fresh supply being employed for each patient, and no other iodine solution being kept in the theatre. At the conclusion of the operation the area is again painted with the solution; a sterile dressing of gauze and cotton-wool is applied and retained in place with a domette bandage.

The solution used is a 2½ per cent. solution of resublimed iodine in pure industrial alcohol. A small quantity of chloroform, in the proportion of one fluid drachm to four fluid ounces, is added to the iodine solution to prevent the evolution of the irritating iodine vapour so common to alcoholic solutions of iodine. Industrial alcohol (the industrial methylated spirits supplied for hospital and special pharmaceutical purposes) is a mixture of plain spirit with 5 per cent.

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of its volume of methyl alcohol, and is preferable to the mineralized spirit since it contains no pyridine or methyl violet, and less methyl alcohol.

In the case under review nothing unusual was observed in the appearance of the skin at the time of operation. The solution employed in the wards and in the theatre for the preparation of the patient was used in several other cases without untoward effects.

The first sign of anything being amiss was observed on the day following the operation, when the patient complained of an intense irritation in the region of the wound. On examination the whole area prepared for the operation was found covered with an erythema with a few pustular spots. A mild boric dressing was applied, and, since this failed to give relief, the application of 10 per cent. ichthyol in glycerin was tried. On the following day the temperature rose to 103°, the erythema being intense and almost plum-coloured, with white spots scattered over the whole area. The pulse rate was 140, and the heart was found to be slightly enlarged, with soft systolic bruits in all areas. There were no abnormal physical signs in the lungs or abdomen; urine was freely passed, and the bowels moved normally. There was slight delirium. The white blood cell count was 12,800 per c.cm. On the third day after the operation delirium was well established, and the pulse became imperceptible. On the advice of Dr. F. M. Milne, dermatologist to the Infirmary, sodium thiosulphate in 5 per cent. aqueous solution was applied to the affected area, with the result that the erythema disappeared in a few hours. The patient died seventy-two hours after the operation with cardiac failure and delirium as the terminal features.

As we were unable to obtain permission from the relatives, the exact pathological changes could not be determined.

Comment.

Inquiry was made as to possible idiosyncrasy, and it appeared that there were grounds for suspecting this, in that, when on holiday in Aberdeen at one time, the patient had been supplied by a chemist with iodine (in what strength of solution we could not ascertain) for the treatment of an abrasion on the toe, and that its application was followed by a severe local reaction. The actual solutions used in the preparation of this patient were used for other patients without ill effect, and there was no departure from the routine preparation already described. It was possible that the strength of iodine solution standing in an open vessel in the warm atmosphere of an operating theatre might have been increased by evaporation. This had been guarded against by the use in each case of a supply freshly poured from a stoppered bottle. Milder forms of dermatitis appear sometimes to be caused by the use of water to cleanse blood from the skin surrounding the area of the wound after the completion of the operation. Aqueous solutions of iodine are more irritant to the tissues than alcoholic solutions, this being noted when catgut prepared in aqueous iodine solution is used for ligatures, as it seems to favour the production of serum in the wounds. Should any cleansing of the skin round the wound be required after operation, spirit or ether should be employed.

It would appear, therefore, that in this case there was a definite and pronounced individual idiosyncrasy to iodine. The actual cause of death was apparently analogous to that in superficial burns from the absorption of toxic products of skin destruction. An interesting feature of the case was the immediate relief to the irritation given by the application of sodium thiosulphate.

Even an exceptional case like this has caused me to review the method of skin preparation preliminary to operation, and I have adopted with success a 1 per cent. solution of iodine in carbon tetrachloride. Over a period of some months only one patient has shown any trace of skin irritation. For many years I used a 3 per cent. solution of picric acid in spirit, and its penetrating power appeared to be great, but the occurrence of dermatitis in a series of cases led me to abandon it.

The Aetiology of Lacrimal Disorders.

By JOSEPH I. KEMLER, M.D., F.A.C.S.

(Abstracted from *American Journal of Ophthalmology*, Vol. 13, No. 7, July, 1930, p. 610.)

EVERY case of dacryocystitis should be investigated as to the possible existence of foci of infection elsewhere in the body, but especially as regards the teeth and upper respiratory tract. Removal of such foci will often lead to cure of the lacrimal disorder.

Lacrimal disorders characterized by the annoying symptom of epiphora which sooner or later becomes purulent occur very frequently. While much has been said about the treatment of this disturbance, relatively little attention has been paid to its ætiology. The lacrimal apparatus is so accessible that when diseased the physician consulted is apt to think of relief only. Yet the treatment is often far from satisfactory.

The mucous membrane of the nasolacrimal duct is very vascular and the underlying structure is rich in lymphoid tissue. This membrane is thrown into folds which are of no special anatomical regularity. Some of these have been called valves, though their rôle as such is doubtful (Whitnall). These folds swell under the slightest provocation, and they then offer sufficient obstruction to prevent proper drainage of the tears, and can become irritated sufficiently to form a locus minoris resistentiæ for infection from any focus, no matter how remotely situated.

According to Santos Fernandez dacryocystitis is very seldom found in the coloured races, due to the fact that the nasolacrimal ducts are longer and straighter. In infants, atresia of the nasal opening of the lacrimal canal and the failure of absorption of the embryonic tissue in the nasolacrimal duct are often causes of dacryocystitis.

In adult life lacrimation is physiological in weeping and also in the presence of all sorts of irritations affecting the terminal expansion of the trigeminus. It occurs in facial neuralgia, migraine, hysteria, exophthalmic goitre, tabes, and pregnancy, and with foreign bodies in the conjunctiva. Tears may flow excessively during mastication, laughing, and coughing, due to forcible contraction of the orbicularis muscle. In old people relaxation of the orbicularis palpebrarum and decreased elasticity of the submucosa of the nasolacrimal duct may cause lacrimation.

Other causes are the pressure of eye-glasses; chronic inflammation of the lids and conjunctiva which has disturbed the normal relationship between the punctum and bulbar conjunctiva; ectropion in deeply set eyes where a triangular space intervenes between the lid and the globe; obliteration of the tear passages by burns or other traumatism; and foreign bodies or mycotic concretions in the canaliculi. Malgat reports a case in which an abscess of the lacrimal canal was found to be caused by a piece of lettuce leaf driven into the nose, and thence into the nasolacrimal duct by repeated sneezing.

Stenosis of the lacrimal duct may also be caused by nasal polypi, disease of the accessory sinuses, scrofulous changes in the nasal mucous membrane, small abscesses in the submucosa of the nasal duct, acute rhinitis, and syphilis of the nasal bones.

Dacryocystitis is almost always secondary to stenosis of the nasolacrimal duct, the great majority of such cases following acute or chronic diseases of the nose. Thus Kruch in 1888 found impairment of the nasal mucosa in thirty out of thirty-five cases. Lacrimal abscesses may be traced to chronic pharyngitis with involvement of the mucous membrane of the nasal cavity and lacrimal duct, producing true stricture which interferes with drainage, followed by development of pathogenic organisms. According to de Schweinitz, in scrofulous persons exostosis of the nasal duct is a cause

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of stenosis. Systemic diseases, such as tuberculosis and lues, are also causes of dacryocystitis.

For the past several years every case of dacryocystitis coming under my observation has been carefully examined for foci of infection, and when such was found it was treated first. The dacryocystitis, sometimes to my surprise, then cleared up very quickly under the simplest treatment, such as probing and washing out the canal; only a few treatments were necessary to establish a permanent cure.

In conclusion, I may say that it behoves us to scrutinize every case of dacryocystitis for some focus of infection, and to remove the latter. In many cases we shall thus cure the lacrimal disease, not only without an operation but without injury to the diseased parts, and with great benefit to the patient.

Health and Empire.

EVERYONE who has to deal with venereal diseases should subscribe to this valuable quarterly journal, published at 10*s*. annually, by the British Social Hygiene Council, Carteret House, Carteret Street, London, S.W. 1. The issue for September 1929 commences with an editorial note on the resolutions of the Lambeth Conference of Bishops on sex matters; the Conference has adopted a sane and healthy point of view in this matter and has admitted the necessity for sex instruction for the young and for those about to marry. Col. L. W. Harrison, R.A.M.C. (retd.), deals in an able article with the co-ordination of maternity and child welfare service with the venereal disease service. Dr. Marjorie S. Wilson and Dr. David Nabarro deal with the problem of the child suffering from congenital syphilis. An important, though brief, article is one by Dr. Gladys H. Dodds on the causes of neonatal death, and another one by Dr. Margaret Rorke on the girl mother in the venereal disease clinic. News from different parts of the British Empire is given, and there are some excellent book reviews. *Health and Empire* is a most important journal in its presentation of the social aspect of venereal diseases and of maternity and child welfare.

The Antiscurvy Vitamin in Apples.*

"AN APPLE A DAY" has always been a popular proverb, and some of the finest apples in the world are grown in India in the Kulu Valley. The antiscorbutic value of apples is therefore a subject of interest in India. The authors' experiments consisted chiefly in feeding guinea-pigs on a scurvy-inducing diet, and adding weighed quantities of apple to it. The authors' conclusions and summary are as follows:—

Conclusions.

One of the main objects of this investigation was to ascertain whether a functional relationship exists between the antiscorbutic principle and any other factor or factors in the apple. The experimental evidence so far obtained does not yet supply the answer. Considering the number of variables involved, it would indeed have been a very fortunate coincidence if the first set of preliminary experiments were to have supplied definite information. We have, nevertheless, reached conclusions, some of which may be considered as more or less established facts, whilst others can serve at this stage only as indications. If some of our observations are not capable of full interpretation at present their significance will, in all probability, be disclosed as the investigation develops.

It is not surprising to find a variation in the antiscorbutic activity of apples, but the persistent high vitamin content of the Bramley's Seedling attracts special attention. Judging from the results so far obtained one may exclude age of tree, soil and season as being directly responsible for this high activity, since, as we have seen, the Cox's Orange Pippin, Worcester Pearmain and Dabinett were grown under similar conditions and yet were less active. The contrast is even more marked when the Bramley's Seedling is compared with the King Edward, a variety resembling it so much. Apart from the difference in the vitamin C content the only disparity which was observed in these two varieties was in the nitrogen content, but, as already stated, the number of estimations was few. Whether this property of the Bramley's Seedling is "racial," and, if so, whether it is associated with any other outstanding characteristic, has still to be established. It would be further of interest to establish whether the smaller degree of difference in the antiscorbutic activity observed among the dessert and cider varieties is definitely characteristic of these apples.

That the high antiscorbutic activity is the property of the average Bramley's Seedling, whether freshly picked or stored, and that it persists after heating, is a point of some interest to the dietician. On the other hand, one can hardly consider the lesser antiscorbutic activity of the dessert varieties, English or imported, as lowering their nutritive value, since when these varieties are consumed under normal conditions the vitamin C requirements are usually amply covered by the general diet; much rather is the dessert apple valued for its palatability, flavour, and other characteristic properties. This point is stressed owing to the fact that there is a tendency at present to give wrong values to experimental facts obtained in vitamin research when applied to practical hygiene and commerce.

It is also quite difficult at this stage to interpret the significance of the disparity in activity of the apples which were stored at 10°C. in an atmosphere of oxygen, carbon dioxide, and nitrogen, and of those which were allowed to age in the ordinary atmosphere at 1°C. What bearing, if any, vitamin C has on the physiological changes of the apple in its age cycle through youth, maturity, and senescence is a problem which still awaits solution and which we hope will be elucidated by the experiments which are now in progress.

Summary.

(1) Of a number of apple varieties tested for their antiscorbutic potency, the Bramley's Seedling was found to be decidedly more active than all the other varieties, which differed among themselves comparatively very much less in their vitamin C content. There were no indications that the character of the soil, or the age of the tree, or season had any effect on the antiscorbutic activity of the apple.

(2) Bramley's Seedlings picked from the same tree 14 days before the normal crop were approximately of the same antiscorbutic activity as those of the normal crop.

(3) There was little loss in the vitamin C content of apples stored at 1°C. in the air or at 10°C. in a mixture of carbon dioxide, nitrogen, and oxygen for about 3 months. The gas-stored apples showed, however, a definitely greater deterioration in the vitamin.

(4) Tests carried out on a number of imported dessert apples showed that the activity was higher in those cases in which the time elapsing between the picking of the fruit and the testing was the shortest. There was no indication of any very marked difference in activity which could be correlated with difference in variety.

(5) The heating of Bramley's Seedlings in their skins hardly affected their antiscorbutic activity.

*The Antiscurvy Vitamin in Apples. By M. F. Bracewell, B.A., E. Hoyle, A.I.C., and S. S. Zilva, D.SC., PH.D., 1930. *Medical Research Council Special Report Series*, No. 146, 1930. His Majesty's Stationery Office, London. Price, 9*s*. net.

Observations on Analgesia and Anæsthesia in Childbirth.

By DAME A. LOUISE McILROY, M.D., D.SC., L.M.
(Abstracted from *The British Medical Journal*, October 4th, 1930, p. 549.)

A CONSIDERABLE amount of discussion has been taking place in Britain as to the necessity for the provision

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of treatment for pain in so-called normal labour. Among medical practitioners the subject is a somewhat controversial one. It is obvious that one of the first principles of treatment in medicine is that when pain is present it should be relieved as soon as possible. Some, however, maintain that the pain of childbirth is an exception, and that any effort towards its relief is against the will of God. Had Sir James Simpson been influenced by the ecclesiastical arguments of his day we might not have had the benefit of chloroform narcosis in obstetrics or in surgery. In obstetrical practice it should be an axiom that pain should be relieved in every case when its relief does not interfere with the safety of the mother or child.

Anæsthesia in cases of complicated labour is a necessity when operative measures are indicated. This is not a controversial subject. It is in cases where labour, although looked upon as normal, is accompanied by pain and suffering, that women now demand relief. How far with safety can we give freedom from pain? A painless labour can never be safe, but a very considerable modification of suffering is within the scope of treatment of every practitioner. In the past little attention has been paid to the subject, but now women refuse to submit to the sufferings borne by their mothers and grandmothers. Not only do they demand relief for themselves, but in London a large and influential group of members of the public is providing resident anæsthetists for various maternity institutions, in order that the patients should be given relief, and that students and nurses should be trained in the advantages of childbirth conducted by humane methods of treatment. The agony of child-bearing is almost worse than any other suffering, and there must be some reason why the average practitioner does so little for its relief. In the first place, so little is known as to the risks of the administration of drugs in labour. Also, if analgesics and anæsthetics are to be given, they entail an additional expenditure of time on the part of the medical attendant. They also involve skilled assistance in many cases, and the expense may be almost prohibitive except for hospital patients and those among the well-to-do. But the question must be discussed and some solution found, since the public is insistent in its demand.

Sedatives tend to prolong labour rather than shorten it in many cases, by diminishing the expulsive forces of the uterine contractions. This adds to the risks of labour for the mother, but more especially for the child. We must therefore have a thorough knowledge of the action of sedative drugs, and only employ those which give the maximum of relief with the minimum of danger. The problem is intensified by the fact that childbirth differs from a surgical operation. Much depends on the temperament of the patient, her environment, and her uterine contractions. The process of labour is prolonged in comparison with surgical conditions, and two lives have to be considered. Some women have little or no suffering; others under the same obstetrical conditions suffer acutely. Each case must be treated individually, and experience and caution are necessary.

In the Report of the Government Departmental Committee on the Training and Employment of Midwives, which was issued in 1929, it was urged that some professional body should make a pronouncement as to the advisability and place in labour not only of anæsthetics, but also of analgesics and sedative drugs in general. A response was made by the British Medical Association, and a report of a committee was issued in April 1930. The main expression of opinion was that of caution, and that any further expansion of the uses of anæsthetics and analgesic drugs in non-operative cases would be associated with danger to the mother and child. The question was left very much as it had been. The report may be of value in view of the present public agitation favouring the indiscriminate use of anæsthetics in all midwifery cases, but it does not give much help or encouragement to those of us who are anxious to relieve suffering whenever it is possible in obstetrical practice.

The opinion of this committee will be referred to later with regard to the use of special drugs. It is by frequent discussions between representative members employed in the practice of anæsthetics in obstetrics and in general practice that we shall in time gain useful information as to the most suitable methods to employ; we may eventually find the perfect method which will give complete relief without any risks to the two lives concerned.

The problems for discussion are the management of the stages of labour; the most suitable analgesics and their dosage for the first stage, and those for the second, combined or not, with anæsthetics; the differences between institutional and domiciliary practice; and the expense involved. We have also to consider the primary question: is relief of pain necessary in so-called normal labour? What are the dangers, complications, and the effects upon uterine contractions, retraction, and post-partum hæmorrhage?

Although analgesia and anæsthesia may involve risks to the mother and child, I am firmly convinced that a considerable amount of our maternal death rate is due to lowered resistance from excessive fatigue, shock, and sepsis, the result of withholding relief during labour. In my clinic, where for the last nine years the use of sedatives, and, when necessary, light anæsthesia for the second stage and during delivery is almost the routine method of treatment in ordinary labour cases, the patients are remarkably free from fatigue at the end of labour, and in a few hours show very little trace of their experience in the labour room. Mental suffering, especially fear, has an effect in lowering the resistance to shock and to sepsis. I am convinced that better results in the management of labour and in the reduction of maternal mortality will be gained by much greater attention to the relief of suffering in labour. Puerperal insanity can to some extent be prevented by the abolition of anxiety and suffering.

ANALGESIA IN LABOUR.

Analgesic or sedative drugs are administered in the first and second stages of labour, since pain is relieved without the loss of consciousness in most cases. Anæsthetics are employed to abolish consciousness, and they are used intermittently in the later second stage, while deeper anæsthesia is used during delivery. Deep anæsthesia is employed where operative measures are necessary.

In the first stage of labour no sedative, as a rule, is required until labour has become established and the patient is conscious of the discomfort of the uterine contractions. The general condition of the patient has to be considered, and also whether she is suffering from pain or only from anxiety and dread of the ordeal in front of her. Pain is felt in the back and abdomen, and she is restless and disturbed. The drugs most usually employed in the first stage are chloral hydrate, potassium bromide, opium and its derivatives, scopolamine, and numerous other sedatives, in combination or alone.

Chloral Hydrate.

Chloral hydrate in doses of 10, 15, or 20 grains is given by the mouth, or by the rectum in some cases; it is repeated as required. This is the rule for most sedatives in labour; no fixed time can be laid down, since patients and uterine contractions vary so much, but when pain is not present no sedative is necessary. Chloral hydrate is usually combined with 10 to 30 grains of potassium bromide given in sweetened water. There is almost no risk to the mother or fœtus, the cervix is softened, and labour progresses although the patient may be asleep. The doses can be repeated during the second stage.

It is said that free bromine in the stomach may cause undue sickness. Plenty of water should be given during labour in all cases. Sometimes the effect of these drugs is slow, or of little benefit, and other drugs have to be resorted to.

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Opium.

Opium and its derivatives have been used from time immemorial. This drug is an ideal sedative from the patient's point of view, inducing restful sleep, arousing no anxiety or discomfort, and aiding dilatation of the cervix, and therefore exercising a beneficial influence on the progress of labour. It is most valuable in the slow dilatation stage in primigravidæ. It rests a tired uterus, and contractions begin again with renewed energy. Opium itself, in the form of the tincture or liquor, is not pleasant to take, and it may cause excitement or sickness. Its derivatives, such as morphine sulphate, omnopon or opoidine, panopon, are much more efficacious in their results if given hypodermically in doses of 1|6 to 1|4 grain. Dissolved in a 50 per cent. solution of magnesium sulphate and injected into the buttock the effect is prolonged. The magnesium sulphate can be repeated without the morphine, and the sedative effect is prolonged.

With such an ideal sedative, why try any other? It is said that the effect of morphine upon the fœtus is fatal in some cases, and its administration is limited to the first stage, or at least not within three hours of delivery. I have used omnopon for many years in the first and early half of the second stage of labour, and I have rarely seen any ill effects from its use. The fœtal heart requires constant auscultation during its administration in the second stage. It accelerates labour, and frequently obviates operative intervention. It relaxes the pelvic tissues, and prevents the patient inhibiting her muscular activities, but it requires to be given by experienced practitioners. Browne, in the examination of 300 fœtal post-mortem examinations, found that four deaths could be traced to morphine administration in labour.

Scopolamine-Morphine.

Scopolamine-morphine—twilight sleep—introduced by Kronig and Gauss in Freiburg in 1907, caused a wave of enthusiasm among obstetricians, but its use was so mixed up with advertising commercial interests outside the profession, and so little was known as to its effects and dangers, that the number of practitioners who still employ this method is somewhat diminished. It is not used extensively in Britain, America, France, or in Germany. The advantages of the combination of these drugs are that pain is relieved, and the patient has no recollection of any suffering. There is no marked ill effect upon the patient. The uterine contractions persist, progress in descent of the fœtus takes place, and there is no additional risk of post-partum hæmorrhage. The third stage of labour is shortened. The scopolamine-morphine must be given early in labour, since it is more difficult to narcotize the patient if she has had experience of severe pain. Most obstetricians give only the initial dose of morphine (1|6 or 1|4 grain), and repeat the scopolamine in varying doses—1|150, 1|200, or 1|450 grain—as indications arise. The chief indication is obtained by means of testing the patient's memory of various objects given to her to recognize. Scopolamine can be repeated up to delivery.

The disadvantages of this method are numerous. It is essentially a form of treatment for the hospital or nursing home, since it requires isolation, complete quietness, and skilled and constant attention. There is sometimes considerable excitement on the part of the patient, which may cause anxiety to her relatives if the confinement is conducted in her own home. She may suffer from thirst, headaches, giddiness, and eye symptoms.

The chief objection is that the fœtus may become affected, and a stillbirth may result; most practitioners put this down to the initial dose of morphine. When successful the method seems ideal, but it can never become widespread, since it involves too much expenditure of time on the part of the practitioner, unless he has a special department with an experienced staff.

Scopolamine-morphine is not suitable if the labour is prolonged, or if operative delivery is necessary. Hyoscine is sometimes substituted for scopolamine, but it tends to prolong labour and to cause post-partum hæmorrhage. A modified method of giving small doses of scopolamine during labour relieves pain to a great extent without inducing loss of memory; this does not require such constant attendance, and gives good results.

Adaline.

Adaline is valuable, given in doses of 5 to 10 grains by the mouth. I have had considerable experience of its use, and have seen no ill effects. It is easy of administration, and relieves pain in both stages of labour.

ANÆSTHESIA IN LABOUR.

Although we look upon anæsthetic drugs as those which are usually administered by means of inhalation, there are other more local methods of obtaining relief from pain in childbirth, just as there are in surgery. It is somewhat difficult to classify the various anæsthetic drugs, since they differ according to their methods of administration.

The chief inhalation methods are those by means of chloroform, ether, and nitrous oxide gas.

Chloroform.

The administration of chloroform in surgical and obstetrical practice seems to be more or less geographical. In Scotland, the home of Simpson, it is more used than in England, where ether is the anæsthetic of choice. Some practitioners prefer ether for surgical operations, but show a partiality for chloroform in obstetrics. It is said that a pregnant woman is very tolerant of chloroform inhalation, and that it does not require such a skilled administrator as in the case of surgical conditions. This is probably due to the fact that chloroform anæsthesia is, as a rule, light and intermittent during labour—*à la reine*. Indeed, during the second stage, chloroform can be given by the patient herself in some cases. The usual method is to give a few drops on a mask and let the patient gently inhale it. As delivery approaches, the quantity administered is increased according to the degree of anæsthesia required. During expulsion, the most painful part of labour, complete anæsthesia may be necessary in some cases. In the third stage of labour it is not necessary to give an anæsthetic unless manual removal of the placenta is to be undertaken. For the satisfactory repair of lacerations it is, as a rule, necessary to anæsthetize the patient.

Chloroform has a soothing effect upon a nervous patient when given only in minute quantities in labour. It often causes the pains to become more regular, and it relieves spasmodic contractions of the perineum and other structures due to the fear of pain on the part of the patient. The more rapid advance of the presenting part can be observed in cases of light chloroform anæsthesia. During delivery more control is obtained, and therefore the risk of lacerations is diminished. The effect of an anæsthetic relieves to a great extent the anxiety of the patient's relatives.

The disadvantages of deep chloroform anæsthesia are difficult to estimate, since other factors, such as operations and complications, are usually involved. The uterine contractions may be diminished or abolished with the consequent prolongation of labour and the possibility of post-partum hæmorrhage. Chloroform is contra-indicated in cases of liver involvement, such as acidosis, toxæmia, and hepatic atrophy. In eclampsia chloroform is given to allay convulsions, but, if there is any serious liver involvement, its administration is accompanied by risk, and chloroform poisoning may ensue. In cardiac conditions chloroform may cause collapse and death; this is more frequent after delivery than during labour. The fœtus is not much affected by chloroform unless the administration is prolonged or deep. It is said that chloroform is partly eliminated by the expulsion of the placenta. It should not be given in a room with a gas fire, since decomposition of its elements may occur and death from poisoning result.

The committee of the British Medical Association recommends the use of pituitrin to conteract the

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Osteomalacia

THE growing incidence among women in India of Osteomalacia, a disease described in the *Lancet* of 1st March, 1930, p. 454 as a '*manifestation of rickets in bones that have reached maturity*' is due to the widespread deficiency of Vitamin D.

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paralysing effect of chloroform upon the uterine contractions. In my own experience this drug is dangerous in any case where there is delay in the second and third stages of labour. Its uses are mainly for hæmorrhage after delivery of the placenta, and as a means of sensitizing the uterus in order to bring on labour.

Ether.

Ether is preferred to chloroform by many practitioners as it is said to be safer; this applies more to general surgery and deep anæsthesia than to midwifery practice. Extensive use is made of it in England, and especially in cases where chloroform is contra-indicated; it can be given by the patient herself in small doses. Ether is pleasant to take, and often acts as a stimulant to the heart; it does not, as a rule, diminish uterine contractions, and is useful in cases of operative intervention, such as forceps, Cæsarean section, and for the repair of lacerations. It has no bad effects upon the fœtus if its administration is not too prolonged or deep. The disadvantages are that it is sometimes slow in action, and needs a special apparatus and a skilled administrator. The chief drawback is its irritating effect upon the respiratory passages; it is therefore unsuitable if pulmonary complications are present or there is œdema of the lungs, as in nephritis. Some of the risk can be reduced by giving ether in a warmed apparatus, but it causes more sickness than chloroform. Ether is inflammable, and care must be taken in domestic practice or in operating rooms where electric appliances, such as the cautery, are in use. Sometimes a mixture of alcohol, chloroform, and ether is given, but not so frequently as in surgical work.

Gwathmey of New York has advocated the instillation of an emulsion of ether into the rectum during labour in combination with the intramuscular injection of morphine in a solution of magnesium sulphate. This method has gained a number of supporters, and in some cases gives excellent results, which improve as the technique becomes more perfected; it is inexpensive, and is easily carried out in a private house. The instillation takes time, and undue excitement on the part of the patient may follow it. There is danger of irritation, and even of sloughing of the rectum, if the ether emulsion is not properly prepared. The amount of absorption of ether must vary to some extent, and cannot be regulated in the same way as by the inhalation method.

Nitrous Oxide.

The administration of nitrous oxide gas and oxygen is undoubtedly the most ideal method of obtaining anæsthesia in midwifery practice; it is safe, relieves pain, and does not interfere with the progress of labour. It may be employed during uterine contractions, and continuously towards and during delivery. It has no harmful effects upon the fœtus. After birth, before the cord is severed, oxygen alone may be given in a case of asphyxia. The after-effects of gas and oxygen are negligible. This method is especially useful in short operations, such as induction, version, forceps delivery, and repairs. It is safe in toxic, cardiac, and pulmonary complications. It is recommended to begin with gas and oxygen, and to decrease the gas as each labour pain nears completion. The disadvantages are that the apparatus is expensive and cumbersome for private practice; a skilled anæsthetist is necessary. Sometimes the patient becomes excited and difficult to anæsthetize. If there is headache after the recovery of consciousness the mixture has contained too much nitrous oxide.

Ethylene.

A mixture of equal parts of ethylene and oxygen has been advocated lately by some American obstetricians (de Lee, Blevis). There is said to be no excitement, the induction period is short, and it is safe in cardiac cases. It has no irritating effect upon the lungs or kidneys. It is useful in light intermittent anæsthesia, and can be supplemented by ether for delivery. It has no ill effects upon the fœtus unless prolonged. Its chief fault is that it is highly explosive.

Local Anæsthesia.

Local anæsthesia is advocated by some obstetricians, more especially for the relaxation of the tissues of the pelvic outlet. Rose, who employs novocain in both stages of labour, gives intradermal infiltrations of the abdominal wall in order to abolish the pain of the skin reflexes; in the second stage he injects it slowly into the perineal structures. He considers that lacerations are usually prevented, and that, if they occur, their repair is easily effected.

De Lee employs procaine combined with adrenaline as a local injection in Cæsarean section operations. Browne uses local anæsthesia entirely for the immediate repair of the perineum, injecting 4 to 6 drachms of a 2 per cent. solution of novocain with 1 minim of 1 in 1,000 adrenaline solution to each drachm of novocain. The infiltration of the perineum and vagina is obtained by a hypodermic needle. Perfect relaxation and anæsthesia result without the discomforts which follow inhalation methods.

Spinal Anæsthesia.

Spinal anæsthesia is employed in surgical practice, and also in midwifery to some limited extent; it does not lessen uterine contractions or interfere with retraction, and therefore does not cause post-partum hæmorrhage. It relieves pain by paralysing the pelvic area. There are no toxic effects upon the liver or kidneys, and it does not seem to harm the fœtus. Burns especially advocates its use in Cæsarean section, in cardiac cases. It has been found to give good results in cases of forceps, version, and breech deliveries. It requires a skilled administrator, especially in obstetrics, and in some cases its effects are very variable. Until it has been more widely employed it is difficult to give an opinion on its merits in midwifery practice, but there is no doubt that it has a place in cases where inhalation methods are contra-indicated. It is not always sufficiently prolonged in its effects in the case of a primigravida. Headache is a symptom, but this can be prevented to some extent by using a very fine short needle for injection. The drugs most frequently employed are stovaine or novocain; cocaine is considered dangerous by most obstetricians. Much of the success of the method depends upon technique and the injection of the drug low down in the cord, so as not to interfere with the uterine contractions.

Conclusions.

Each maternity case must be given individual attention with regard to the most suitable sedative and anæsthetic to be employed. The age, parity, temperament, general health, and complications, if present, must all be carefully considered. Obstetrical anæsthesia is not quite comparable with the surgical form. The pain is prolonged, and has to be combated with sedatives as well as with anæsthetics; the effect of these sedatives must be taken into consideration when an anæsthetic is decided upon.

Light anæsthesia is of little use in surgery, while it is generally employed in midwifery practice, except in cases where operative intervention is required. The action of the uterus must be maintained, and hæmorrhage after delivery must be prevented as far as possible. The expenditure of time, with its consequent financial complications, is a consideration. It is desirable that private patients should have the continuous attendance of the practitioner during labour, if sedatives or anæsthetics are to be given, just as in hospital practice; yet it is impossible to demand this unless adequate financial compensation is made by the patients for the loss of practice elsewhere.

In surgical practice only one life is involved. In midwifery the interests of the child are of great importance in uncomplicated cases where the only consideration for treatment is the relief of pain to the mother. Perhaps the safest sedative is chloral and potassium bromide, and the safest anæsthetic is gas and oxygen, from the point of view of the fœtus.

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It is a common mistake to carry out violent methods of artificial respiration if the infant does not breathe immediately after birth. We have to remember that it is narcotized to some extent, and requires time to recover; warmth, rest, and clearance of its respiratory passages are sufficient in most cases of delayed respiration, but CO_2 and oxygen should be given if there is any undue delay. Many an infant loses its life from misguided methods of restoring animation, such as bathing and artificial respiration.

In England, where there is so much discussion at present as to the advisability of every woman in labour having relief from suffering, the question is, What is to be done about the patients under the care of midwives? These number about 60 per cent. of all in the country. Are these patients to be excluded from all methods of relief from painful labour? Are they to be attended by an anæsthetist, and, if so, who is to bear the expense? If midwives are to be permitted to give sedatives, or even anæsthetics, it will involve general training in surgery and medicine and special training in sedative administration. This is a real problem, and the opinion of the medical profession is divided.

There is room for much reform in the management of labour by medical practitioners, and perhaps that is the first step to be taken. The agony suffered by parturient women is one which has called for relief throughout the ages; it should appeal to every humane individual in the medical profession.

Reviews.

MEDICINAL DRUGS OF INDIA.—By Kaviraj Balwant Singh Mohan, Vaidya Wachaspati (Pb.), A.M.A.C. (Mad.). First Edition. Lahore: Atma Ram and Sons, 1930. Pp. 258. Price, Rs. 2. Foreign 3s.

CONSIDERABLE interest has been manifested of late years in the drugs used in the indigenous systems of medicine and a number of books have been written on the medicinal drugs of India. Most of these publications are mere compilations from the already existing literature and Kaviraj Balwant Singh Mohan's book on "Medicinal Drugs of India" is not an exception. The book belongs essentially to the catechism series and the author has condensed in a small space the main uses of the drugs as stated in books on Ayurvedic medicine. The botanical descriptions of the various medicinal plants are omitted and this can be readily understood because elaborate accounts are to be found in various books on the subject. It is not understood, however, why the author has not taken the trouble to give the chemical composition of the drugs worked out during recent years. Statements have been made for which the author has no justification, for instance writing about *Terminalia arjuna*, the author says on page 6 that "recent researches have conclusively shown that the drug is a cardiac stimulant, increasing the force of contraction and prolonging the diastole, etc., etc." On the contrary recent work shows that the drug has no stimulant action on the heart.

The part dealing with prescriptions made from indigenous drugs will be useful perhaps to the students of Ayurveda, but on the whole the book is of very little interest to the practitioners of western medicine.

R. N. C.

ROENTGENOGRAPHIC TECHNIQUE.—By D. A. Rhinehart, A.M., M.D. London: Henry Kimpton, 1930. Pp. x plus 388, with 159 illustrations. Price, 28s. net.

As the title suggests, the scope of this work is limited to the technical side of the subject, that is to say to problems connected with the exposure and development of films.

The author stresses the necessity for a basic *X*-ray technique, and in order to arrive at this he introduces a series of experiments for determining the operating peculiarities of each *X*-ray machine, by providing a simple experimental method of measuring the *X*-ray output of each equipment; and by basing exposures on the thickness and *X*-ray density of parts of the body.

A method of perfecting an *X*-ray technique has been devised that may be used by an *X*-ray expert, irrespective of his apparatus.

The chapters leading up to the development of a basic technique are followed by one on certain miscellaneous instructions regarding such matters as diaphragming, immobilization, suspension of respiration, identification of films, timing exposures, stereoscopic films, etc.

Following the above are 9 chapters on the radiography of the various parts of the body, giving details of position, etc., each accompanied by a photograph of the relative positions of the *X*-ray tube and the body, and the negative to be obtained.

In examination of the gall bladder by the dye method, the author seems to prefer the intravenous to the oral process on account of the irregularity in absorption of the dye from the intestine. With this we entirely agree, and may state that since the adoption of a careful technique with May and Baker's Opacin, we have never had any serious reaction therefrom.

In considering the radiography of the gastro-intestinal tract, the author lays stress on the importance of the influence of habitus on the form and position of some of the thoracic and abdominal viscera.

An important and seemingly unexplainable omission is that of the details of the technique of Lipiodol examination of the lungs and sexual organs of the female.

Apart from this, the work is a monumental one in its scope and completeness, and should be in the hands of every technical radiologist.

J. A. S.

DIATHERMY—MEDICAL AND SURGICAL—IN OTO-LARYNGOLOGY.—By Dan McKenzie, M.D., F.R.C.S.E. London: Kegan Paul, Trench, Trubner & Co., Ltd., 1930. Pp. xiv plus 184, with 23 illustrations. Price, 10s. 6d. net.

THIS volume gives a complete account of the application of diathermy in modern oto-laryngological practice. The author has incorporated in this little volume the very latest work done in this branch of electro-therapeutics. It has been written with decision and authority by one who is qualified by his own research work in this sphere to dogmatise.

The style of the text is lucid. The illustrations, most of which are original, are extraordinarily clear and the text written in that lucid style which characterises the man who knows what he is talking about.

We can confidently recommend this work to all interested in this branch of electro-therapeutics.

J. A. S.

FAUNA OF BRITISH INDIA. CESTODES. VOL. I.—By T. Southwell, D.Sc., Ph.D., A.R.C.S., F.R.S.E. London: Taylor and Francis, 1930. Pp. xxxi plus 391. Price, 22s. 6d.

AFTER a full discussion of the many attempts that have been made in recent years to formulate a working classification of the Cestoda, the author of this book suggests still another. He divides the Class into two Orders, *Cestodaria* and *Eucestoda*, which has the merit of simplicity and consistency, in that it makes a clear division between the Monozootic and Polyzootic cestodes, and which consequently is an improvement on other systems, most of which tend to unduly multiply the number of Orders.

This volume deals with the *Cestodaria* and the *Eucestoda*, with the exception of the large group of *Tænoidea*. Although it only describes the worms

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found in India and its surroundings, such a large number of the species in the groups dealt with in this book have been found in this locality, that it is a valuable book of reference for anyone dealing with these worms in any part of the world. It has the added value that the author has made the subject of fish cestodes, which compose a large part of the volume, one especially his own, and in consequence many of the descriptions and drawings are by the author himself, who is a recognised authority on this group of worms. In addition to the special descriptions of Indian cestodes the book contains a useful description of the anatomy of cestodes in general, and a fund of useful advice on the collection, preservation and staining of these parasites. The volume is well printed, the illustrations are clearly reproduced, and the binding is good, but it is as irritating to find a relatively expensive book such as this one is, with the top of all the leaves uncut. If the second volume, which has not yet appeared, comes up to the standard of the present one the two together will make a work of reference which every systematic helminthologist can ill afford to be without.

P. A. M.

THE VOLUME OF THE BLOOD AND PLASMA IN HEALTH AND DISEASE.—By L. G. Rowntree, M.D., and G. E. Brown, M.D., with the technical assistance of G. M. Roth. Philadelphia and London: W. B. Saunders Company, 1929. Pp. 219, with 47 tables. Price, 14s. net.

A METHOD of determining the volume of the plasma and the blood was introduced in 1915. This method depended on the introduction of a slowly absorbable and non-toxic dye into the circulation and from the extent of dilution of the dye, as estimated by the colorimeter, the plasma volume was computed. The accuracy of the method was criticised and it fell into disrepute, but the authors who have made some modifications of the original technique are convinced that now the volume of the blood and plasma of individuals can be rapidly and correctly estimated. Their experiments have extended over six years and have involved more than 1,000 determinations in a series of 350 clinical cases.

It must be confessed that nothing dramatic has been discovered, and very little that will be of immediate value to the clinician.

The blood volumes in the various anæmias and in cases with œdema are perhaps the most interesting.

The data obtained in cases of nephrosis are quite different to those in cases of glomerulo-nephritis and this may be of considerable value in estimating the prognosis in diseases of this kind. As we should expect in a book that emanates from the Mayo Clinic there is nothing left to be desired in the presentation of the subject.

The printing is good and the bibliography and index are complete. This monograph should be of great value to the hæmatologist, but will scarcely appeal to the ordinary practitioner.

H. H.

THE PHYSIOLOGICAL PRINCIPLES OF HYDROLOGY.—By R. G. Gordon, M.D., D.Sc., F.R.C.P.E., and F. G. Thomson, M.A., M.D., F.R.C.P. London: Jonathan Cape, 1930. Pp. 128. Price, 5s. net. Obtainable from Butterworth and Co. (India), Ltd. Price, Rs. 3-12.

WATER as a therapeutic agent, externally and internally, is as old as the hills. The Father of Medicine mentions it, wrote a treatise on it, but apparently did not think much of it as a remedial agent, although he insisted on the necessity of purity in drinking supplies. Water is the most common vehicle for the application of heat and cold to the body and is in daily use in general medicine. Mineral waters contain variable quantities of salines or gases in solution and in virtue of them can be used for therapeutic purposes. The object of this book, a volume of the 'Modern Treatment' series, is to enable the practitioner to decide, on his own initiative, whether this form of treatment is likely to be of help to his patient, and if so to guide him as to the most suitable spas. The book treats of the relation of the physiology of the skin, the circulation, of the nervous system and of metabolism to hydrotherapy, and then of the application of mineral waters externally and internally to disease. It is perhaps of particular interest to medical men in the tropics who have to deal with that ambiguous class of case which is euphoniously called "liver." The book is a handy and succinct account of spa treatment and should prove useful to medical men in India who, as a rule, have little knowledge on the subject and who are not infrequently asked to advise upon it.

J. D. S.

THEORY AND PRACTICE OF NURSING.—By M. A. Gullan. Third Edition. London: H. K. Lewis & Co., Ltd., 1930. Pp. xvi plus 238, with 3 coloured illustrations. Price, 9s. net.

THIS is the third edition of Miss Gullan's book on nursing and it represents all that is best in the methods of training and teaching nurses that are carried out in the London schools of medicine.

The modern nurse has to know a great deal of theory and must understand the physiological and pathological reasons for the various forms of treatment that she is instructed to undertake.

A book of this kind is therefore essential. Miss Gullan's has stood the test of time and should increase in popularity.

The original text has been little altered but some additions have been made and the subject-matter is entirely up to date.

The book is well arranged and well printed.

There are no illustrations except the 3 coloured ones, which is an unusual feature. This does not detract from its value for we consider that the numerous pictures in many books of this kind are hardly necessary for the instruction of those who are daily engaged in practical work.

H. H.

THE PRINCIPLES OF BACTERIOLOGY AND IMMUNITY.—By W. W. C. Topley, M.A., M.D., M.Sc., F.R.C.P., and G. S. Wilson, M.D., M.R.C.P., D.P.H. Volumes I and II. London: Edward Arnold & Co., 1929. Pp. 588 plus xvi in volume I, and 712 plus vii in volume II. Price in the United Kingdom for two volumes combined 50s. net.

ON receipt of the two volumes which constitute Topley and Wilson's "Principles of Bacteriology and Immunity," the first mental reaction of the reviewer was a feeling that the subject had already been dealt with sufficiently well to suit the needs of each and every class of student of medical bacteriology. But, after reading the authors' apologia in their introduction, he was very ready to admit that his first impression was entirely wrong and that there is more than one serious gap in the literature of medical bacteriology in the English language. The most obvious gap is one that is now being filled by the Medical Research Council who have arranged for the publication of a comprehensive handbook of bacteriology written by numerous specialists in their own subject; up to now the German "Handbuch der Pathogenen Micro-organismen" has been the only work of this nature published in any language. In the second place there is no single work to which the post-graduate student can be referred which will give him the right admixture of ecology, systematic, general, medical and veterinary bacteriology. Most of the manuals are designed for the under-graduate student and although many of these may contain much more detail than he wishes, or finds it necessary to learn, they do not contain sufficient groundwork for a thorough understanding of the subject which the more advanced

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student of medical bacteriology must acquire. The authors of this work have gone a very long way towards filling this gap.

The work is divided into four parts—General Bacteriology, Systematic Bacteriology, Infection and Resistance, the Application of Bacteriology to Medicine and Hygiene. It will be noted that there is not the usual section on bacteriological apparatus and technique; this, the authors consider, is a special subject on which there are innumerable books. This does not mean that they have omitted all references to medium and technique; these subjects are dealt with in their natural place where the biological characteristics of each group or of each specific organism are described, but it is assumed that the reader has had a grounding in ordinary bacteriological technique.

Each subject is dealt with in a thoroughly masterly manner. The authors' style is an easy one and they always manage to make their point clear. The chemistry and mathematics may now and then be a little beyond the grasp of some of their readers but this is not the authors' fault, as simplification beyond a certain point is impossible.

The only criticism that the reviewer can offer is that the authors do not appear to have taken the Twort-d'Herelle phenomenon—as they call it—quite as seriously as it deserves. Admittedly our knowledge of this phenomenon is very limited, but it certainly seems possible that it will make it necessary to rewrite in the near future almost every chapter on bacteriology that has ever been written. They have dismissed the subject in 9 pages. Perhaps their method was after all the best one; they may have seen the alarming possibilities and, feeling unable to contend with them, preferred to adopt the proverbial tactics of the ostrich. The references, which appear at the end of each chapter, are comprehensive.

The format of the book is excellent; the page is exactly the right size, the type is clear, the illustrations—not over-profuse and all to the point—are well reproduced, and the whole forms two very handy volumes.

It is, in the opinion of the reviewer, by far the best book on bacteriology in the English language.

L. E. N.

PATHOGENIC MICRO-ORGANISMS: A PRACTICAL MANUAL FOR STUDENTS, PHYSICIANS AND HEALTH OFFICERS.—By W. H. Park, M.D., A. W. Williams, M.D., and C. Krumwiede, M.D. New Edition. Enlarged and thoroughly revised. London: Baillière, Tindall and Cox, 1929. Pp. lx plus 819, with 216 engravings and 9 full-page plates. Price, 30s. net.

IT is surprising how frequently the word bacteriology is used in the title of a book when it does not in any way indicate the scope or limitations of that book. The medical man is liable to think that bacteriology always means medical bacteriology and in the mind of the pure clinician it is seldom distinguished from protozoology. When the first edition of the book under review was published extremely little was known about the protozoa, but by the time the second edition was in the press the authors realised that the advance in our knowledge of this science necessitated its more serious consideration and they had the courage to alter the title of their third edition to its present more comprehensive one; we wish that more authors had followed their example.

The first three hundred pages deal with the general principles of the study of pathogenic organisms, including classification, technique, and the immunological reactions of body. The second part of the book consists of chapters on the specific groups of organisms. Of this section of the book the bacteria, quite rightly, get the lion's share; there is, however, a short chapter on the spirochætæs, one each on the higher bacteria—which for practical purposes means actinomyces—and on moulds, one on filtrable viruses and diseases of unknown ætiology, and then two separate chapters on small-pox, rabies and yellow fever. It is not quite clear why these last two chapters have been separated from the previously-mentioned one on filtrable viruses by six chapters on the protozoa. Part III is comparatively very short, only 80 pages; it treats with the application of bacteriology to public health.

The advances in the present edition consist of the rewriting of a number of chapters, notably those on the pyogenic cocci, the paratyphoid bacilli and the pneumococci. There has also been a certain amount of revision in almost every chapter in the book. The bibliography has been brought up to date.

As a practical handbook or as a book for class purposes it is one that we can thoroughly recommend. The descriptions are clear and concise; the illustrations and text-figures are not over-profuse—the modern tendency in American books—but are all to the point, forming a necessary supplement to the text descriptions; and throughout a nice balance has been observed in dealing with the various subjects, few appear to be neglected and none overstressed.

We have very few criticisms to offer. In our opinion the bacteriophage has not received the serious attention which is commensurate with its importance and we cannot altogether agree with the statement that most workers have come to the conclusion that the phenomenon is due to a ferment and not a living organism. In the chapter on yellow fever—on whose curious divorcement from the rest of the filtrable virus diseases we have already commented—there does not appear to be any mention of Hindle's recent and most important work. The protozoa receive far better treatment than is usually the case in books of this nature, but figure 182, "Schematic drawings of flagellates belonging to the trypanosomedæ (sic!)," is definitely misleading.

The printing and paper are excellent and the sheet is of a very suitable size. The volume is at present not too large for comfortable handling, but if the subject-matter is to be increased in future editions the authors will have a problem to face. The illustrations, especially the coloured plates, are excellently reproduced. To summarise, the book is the best American manual on the subject which has come into the reviewer's hand.

L. E. N.

GENERAL MEDICINE: THE PRACTICAL MEDICINE SERIES COMPRISING EIGHT VOLUMES ON THE YEAR'S PROGRESS IN MEDICINE AND SURGERY. —Edited by G. H. Weaver, M.D., L. Brown, M.D., G. R. Minot, M.D., W. B. Castle, M.D., W. D. Stroud, M.D., and R. C. Brown, M.D. Series 1929. Chicago: The Year Book Publishers. Pp. 829. Illustrated. Price, $3.00.

General Medicine, edited by Weaver and others, is one of a series of eight year books issued at various intervals during each year. The book covers the entire field of recent medicine. The statistics relate to the incidence of diseases in America. This volume contains the chapters on infectious diseases, the chest diseases, diseases of the blood and blood making organs, the heart and blood vessels and gastro-intestinal tract. The editors are to be congratulated for bringing out the latest information and discussion on the treatment of these conditions in a handy book form. The book is recommended to general practitioners.

S. B.

INCOMPATIBILITY IN PRESCRIPTIONS AND HOW TO AVOID IT.—By Thomas Stephenson, D.Sc., Ph.C., F.R.S. (Edin.), F.C.S. New Edition. Revised. Enlarged. Edinburgh: "The Prescriber" Offices, 1929. Pp. 61. Price, 4s. 6d. net.

THE new and revised edition of *Incompatibility in Prescriptions* promises to be a very useful book for medical students, for in it they will find a fairly complete and satisfactory account of the subject in a small space. The book is divided into two main parts—the first part deals with the general principles of

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incompatibility and the second part contains a dictionary of incompatibilities. The different varieties of incompatibilities have been presented in a systematic and rational manner calculated to arouse interest in the minds of the readers. Unnecessary details and long tables of incompatibilities in prescriptions have been avoided so that they might not tax the memories of the students unnecessarily. The summary of the drugs with their doses, solubilities and incompatibilities in the second part of the book will also be very useful for ready reference in cases of difficulty in dispensing. The book will be very useful to medical students, doctors, and dispensing chemists.

R. N. C.

TUBERCULOSIS AMONG CHILDREN.—By J. Arthur Myers, Ph.D., M.D., F.A.C.P. London: Baillière, Tindall and Cox, 1930. Pp. xiv plus 208, with 43 text-figures. Price, 16s. net.

MYERS' *Tuberculosis among Children* is a further addition to the already extensive library of books on tuberculosis, and its place in that library is likely, we think, to be a permanent one. The subject under discussion is divided into three main sections, viz., tuberculosis in infancy, tuberculosis in childhood, and tuberculosis in the between ages. The first section opens, appropriately enough, with a discussion on congenital tuberculosis including a brief survey of the views of Hippocrates, Aretaeus (who is, incidentally, referred to in the text as Artaeus) and Laennec. Attention is next directed to the question of diagnosis and here we have a brief but lucid account of the application of tuberculin tests, particularly the intracutaneous or Mantoux test upon which Dr. Myers places very great reliance.

Childhood type tuberculosis is the term employed by American workers to describe the diffuse or focal lesions in the lungs and adjacent tracheo-bronchial nodes that result from a *first* infection of the pulmonary tissue with the tubercle bacillus. The adult type of tuberculosis, on the other hand, never develops except in the presence of a *previous* infection with tubercle bacilli which has resulted in some immunity; it usually shows itself first in the region of the lung apices, there is a strong tendency towards fibrosis, and the regional lymph nodes do not show the same changes as they do in the childhood type.

One of the most important chapters in the book is the last one entitled "Some Dangers to Children from Tuberculosis among Elderly People." After perusing the almost disconcerting case-histories quoted by Dr. Myers, one is driven to advocate the routine examination for tubercle bacilli of the sputum of every sufferer from that very common complaint—chronic bronchitis and emphysema.

The author is a little apt to disparage the value of a careful clinical examination of the chest; apart from this the book is well balanced. The reproductions of skiagrams are excellent and the paper is of good quality, but printing errors are unpleasantly numerous—in a fairly rapid survey we detected no fewer than eighteen in less than two hundred pages of reading matter.

J. M. H.

ASTHMA AND ITS TREATMENT.—By Percy Hall. London: Messrs. William Heinemann (Medical Books), Ltd., 1930. Pp. ix plus 130. Price, 7s. 6d.

THIS book is supposed to deal with asthma and its treatment. One is puzzled at first as to why this book was ever written, the author in his preface clears the point up by stating, "I determined to write this book because during the last few years I have received so many communications from—to me—unknown correspondents, who appear to have read various stray references I have made in previous writings to the treatment of asthma by physiotherapeutic measures." The book really deals with 21 cases treated by the author who used actinotherapy and diathermy. There is nothing in the book that one does not know, and the vitamines from A to D are dragged in, because one presumes the subject happens to be fashionable. We hope that this book will supply the necessary information to these unknown correspondents, but it is of no use to the medical profession, as it contains nothing new.

H. W. A.

SLIT LAMP MICROSCOPY OF THE LIVING EYE.—By Dr. F. Ed. Koby. London: J. & A. Churchill, 1930. Pp. xvi plus 360, with 104 illustrations. Price, 15s. net.

THIS is the second edition of Dr. Koby's book translated into the English language by Doctors Goulden and Harris.

The first edition has proved so useful to the ophthalmological world that the appearance of the new edition will be welcomed as considerable advance has been made in slit lamp observations in the last few years.

The book consists of nine chapters with an extensive bibliography. Chapter I deals with the apparatus used in slit lamp microscopy and its application to clinical examination. Slit lamp microscopy in ultra-violet light is also discussed, which has a scientific rather than a practical interest.

Chapter II deals with methods of examination and methods of illumination in direct light, in transillumination, in the zones of specular reflection and in direct light. It is often of great importance in ocular microscopy to determine at what depth in the eye some alteration or other is situated and here the author describes the technique of examination.

Chapter III deals with the phenomena of reflection of light by the ocular media. To understand ophthalmoscopy is to understand how to avoid reflexes and sometimes to use them rationally. The ocular media comprise several zones of discontinuity and a luminous beam striking such a zone provokes certain optical phenomena of which we can study those of reflection by the corneal microscope.

Chapters IV to IX deal with individual descriptions of the conjunctiva, cornea, anterior chamber, iris, crystalline lens and the vitreous body. The same method of arrangement has been adopted in each chapter: special technique of examination of the organ to be considered, normal appearance, congenital anomalies, senile changes, traumatic lesions and pathological changes. To English speaking ophthalmologists the English translation of Dr. Koby's famous work on the *Microscopy of the Living Eye* will prove invaluable as most of the original work on the subject has all been written in German, and besides the author has had the unique advantage of having enjoyed for several years the instruction of Professor Vogt of Zurich, the greatest master of the subject.

The book is full of interest and forms most delightful reading, but it will hardly need to be said that it will be found most profitable to those already *au courant* with ordinary ophthalmoscopy and that it will not replace the ordinary textbooks of ophthalmology.

We cordially recommend the book to medical men and students interested in ophthalmology, both as a guide to the study of slit lamp microscopy of the living eye, and as an excellent book of reference.

E. O'G. K.

DISEASES OF THE SKIN.—By George Clinton Andrews. London and Philadelphia: W. B. Saunders Co., Ltd., 1930. Pp. 1091, figures in the text 988. Price, 55s. net.

THIS textbook on "Diseases of the Skin" is beautifully illustrated by nearly a thousand photographs. Each photograph depicts clearly the type of lesion, and in going through the book one sees exactly what the author considers to be the characteristic lesion or lesions

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of that disease. On the other hand there are several figures which we consider not to be characteristic of the particular disease concerned, this is not the fault of the author but due to the fact that dermatologists often group lesions under a single heading, and do not investigate the cause. The second point about this book is that the sections on the treatment by *X*-rays, Grenz-rays, radium, ultra-violet and diathermy therapy are given in detail, for nowadays the dermatologist has to know a good deal about these various physical methods used for the treatment of skin diseases.

We fully agree with the author in his statement as to the unsatisfactory state of the classification of skin diseases. The terminology is still worse, as most of the diseases have a Greek or Latin name which is often qualified by one or more adjectives also in Latin. In India the student has not even the benefit of the small amount of Latin and less Greek that the Western students possess, so that this combination in terminology represents an almost insuperable difficulty to him. To add to this confusion many lesions have two or more names. As the author states, if 90 per cent. of these synonyms were abolished there would be a considerable gain to the science of dermatology. The numerous illustrations he gives enable us to see vividly what lesion or lesions are characteristic of each disease. The heterogeneous lesions grouped under the term eczema are depicted in 11 plates, and one can readily sort out lesions that are due to external cases and those due to allergy.

We consider that the author has fully carried out the intention that he set out to do when writing this book. He has written this book and embellished it beautifully with photographs, so that it will serve a very useful purpose, and he has kept down the text to reasonable limits and not entered into lengthy and controversial discussions. The book moreover has a very large bibliography which should be valuable to the consultant. There are no coloured illustrations, this enhances the value of the book as very few coloured plates are really capable of properly depicting these lesions, and by saving expense in this way he has been able to give us this large collection of clinical material. This book on dermatology is one of the best books that has ever been published on the subject.

H. W. A.

DAMPATI. (IN BENGALI.)—By S. K. Sen, B.A., L.M.S. Second Edition. Published by the author. Obtainable from 45|1B, Beadon Street, Calcutta. Pp. 235 with 3 figures in the text. Price, Rs. 2-8.

THE author has dealt with eugenic science in a dignified style. He has added three new chapters in this edition relating to anatomy and physiology of reproduction, the psychology of the female sex at puberty and the sequelæ of rupture of perineum after labour. A publication of this nature was a great want in the Bengali language. The book is recommended to all young married couples who should know many things about sexual questions so that happier and healthier children may be born to them.

S. B.

EXERCISE: ITS FUNCTIONS, VARIETIES AND APPLICATIONS.—By Adolphe Abrahams. London: William Heinemann (Medical Books), Ltd., 1930. Pp. viii plus 92. Price, 3s. 6d. net.

THE author, apologising for the addition of one more book to the innumerable works upon exercise, remarks: "So far as I am aware, no attempt has hitherto been made to consider the subject of exercise in general with the particular indications for the varying requirements of age, sex and physical capacity." The classification of the subject-matter into twenty convenient chapters with the above scheme in view and the presentation of the facts in an attractive manner make this little volume eminently readable. In the first fifteen pages a rational explanation of the function of exercise is given. The subsequent chapters deal with various forms of exercise, viz., walking, swimming, mountain climbing, dancing, etc. In the last part useful information on diet, training, ill-effects of exercise and corrective exercise is recorded in simple language.

The book claims to give nothing new; but it presents the intricate subject of exercise in relation to its various aspects in a charmingly popular manner and hence will appeal to a wide circle of readers.

S. S. R.

A TREATISE ON HYGIENE AND PUBLIC HEALTH, WITH SPECIAL REFERENCE TO THE TROPICS.—By B. N. Ghosh, F.R.F.P. & S. (Glasg.). Seventh Edition. Pp. xxvi plus 728, with 149 illustrations. Calcutta: Scientific Publishing Co., 1930. Price, Rs. 6-8 or 10s. 6d.

THIS well known and admirable book needs no introduction to our readers, for most of them are familiar with it. The first edition was published in 1912, and the sixth in 1927; the fact that a seventh has been called for in three years is a sufficient indication of the value and popularity of the work. What renders it so extremely useful to public health workers and students in India is that it is written especially from the point of view of conditions in the tropics; also its handy size, the immense amount of accurate information which it contains, and its low price. It includes 26 chapters, 3 appendices, and a good index; also it is well printed on a good quality of paper (though we think that the quality of the illustrations might be improved on in the next edition; they appear to be too lightly inked).

The book follows upon the usual lines, but always with special attention to Indian and tropical conditions and requirements. The introductory chapter on public health administration gives an account of the evolution of public health administration in India. Successive chapters follow on water, air, ventilation, occupational hygiene, soil, houses, food and diets in India, refuse disposal, sewage, disposal of the dead, personal hygiene, climate and meteorology, parasites, preventable diseases, inspection of schools, maternity and child welfare, sanitation in all its aspects, and vital statistics. The appendices deal with the duties of district health officers in Bengal, and the duties of sanitary inspectors.

In the present edition the entire text has been subject to most careful revision, much of it being re-written. New sections deal with heredity and eugenics, the physical geology of India, trypanosomiasis, and the dysenteries. The chapter on vital statistics has been re-written, and special articles on statistical methods have been added to meet the requirements of the D.P.H. standard; also 27 new illustrations have been added. The author has been greatly assisted by Lieut.-Col. A. D. Stewart, I.M.S., in the preparation of this edition. The sections on malaria and mosquitoes have been re-written by Major G. Covell, I.M.S., of the Malaria Survey of India; whilst the entire book has been revised by Lieut.-Col. A. B. Fry, I.M.S.

Dr. B. N. Ghosh and his publishers are to be congratulated on the continued popularity and usefulness of this book.

R. K.

BEDSIDE MEDICINE.—By A. R. Majumdar, M.B. Second Edition. Pp. 584, with 184 illustrations. Calcutta: The Book Co., 1930. Price, Rs. 7-8.

WE had the pleasure of reviewing the first edition of this most useful book in our issue for August 1928, p. 486. The fact that a second edition has been called for in the short space of 28 months is sufficient indication of its usefulness and popularity. The book has four special merits: it is brief and compact, its price is low, it is written essentially from the standpoint of practice in India and in the tropics, and it is full of original photographs. In passing, it may be noted that the reproduction of the illustrations has been much

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Erysipelatis, 226	Lesion	1-150
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Urine 8213	Urine	1-150
Rheumaticus. Beattie	Joint	1-300
Sputum A	Unresolved pneumonia	1-700
Sputum B	Unresolved pneumonia	1-700
Viridans 1080	Tonsil	1-1000
HAEMOLYTICUS 2060	—	*1-1500*
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improved upon as compared with those in the first edition.

A foreword is contributed by Major-General J. W. D. Megaw, Director-General, I.M.S. General Megaw writes, "The most perfunctory examination of the work shows how great an amount of care and labour has been devoted to its production. A special feature is the large number of original illustrations which will make a special appeal to Indian medical men and students.... the book does not fall into the great category of publications which have been written to supply 'a long felt want' on the part of the authors rather than of the public."

Essentially, the book is a handbook of medical diagnosis, symptoms, physical signs and laboratory methods written from the standpoint of practice in the tropics. And, inasmuch as the author has had many years' experience of teaching medical students in Calcutta, the book should make a special appeal to medical students in India. We have only to add that the whole has received most careful revision in the present edition, and that format, binding, and general style of publication of the book are excellent.

R. K.

MODERN PHARMACOLOGY AND THERAPEUTIC GUIDE.—By A. R. Majumdar, M.B. Second Edition. Pp. 596. Calcutta: The Book Co., 1930. Price, Rs. 5.

THE fact that a second edition of this convenient handbook has been called for within a year of the publication of the first well indicates that it meets the need in India for a compact, handy and accurate work on pharmacology and therapeutics, issued at a low price, and useful alike to medical students and practitioners. We reviewed the first edition of this work in our issue for September 1929, p. 531, so here need say but little further with regard to it. A special feature of the book are the numerous prescriptions given at the bottom of the pages; in fact the book may be termed the "Hale White" of India. In a foreword to the book Lieut.-Col. R. N. Chopra, I.M.S., writes: "The present volume has been very carefully and thoroughly revised and many chapters have been amplified. The pharmacological action of drugs has been treated in greater detail, and more attention has been paid to the therapeutic side. This edition also includes important extra-Pharmacopœial drugs, as well as those drugs used in the indigenous medicine in India whose value in therapeutics has been definitely proved. All these greatly enhance the utility of the book to students."

In the present edition the sources of crude drugs in India is dealt with, also the rules for the "Possession for sale and the Sale of Poisons (India) Act of 1919." An extra chapter deals with the preparation of invalid food, and details invalid foods suitable for Indian patients with caste prejudices. The author has been helped considerably by Col. Chopra in the sections dealing with Indian indigenous drugs.

This book will make a special appeal to Indian medical students, though the general practitioner in India will also find it a very convenient handbook for reference. It is well printed and got up.

R. K.

(i) AIDS TO HISTOLOGY.—By A. Goodall, M.D., F.R.C.P. (Ed.). Third Edition. 1930. Pp. 147, with 20 figures. Price, 3s. 6d.

(ii) AIDS TO BACTERIOLOGY.—By W. Partridge, F.I.C. Fifth Edition. 1930. Pp. 311. Price, 5s. Published by Messrs. Baillière, Tindall and Cox, London.

THAT Messrs. Baillière, Tindall & Cox's "Aids" series are exceedingly popular with medical students is shown by the fact that the first of these two volumes has reached its third edition since 1911. The present edition has been completely revised, and much of it re-written. New work, especially on cell structure, and new methods have led to considerable additions.

The second book is rather more ambitious, the subject indeed being one which it is difficult to condense to the size required. It is extremely comprehensive for its size, however; it includes much information on general bacteriology, public health bacteriology, the bacteriology of soils, food supplies, etc.; in fact it will be of use not only to medical students, but also to laboratory workers as a handy book for reference. The present edition includes many new sections. [We confess that we do not like the protozoology of the book; the young malaria ring is *not* a nebulous body; no one (in the tropics) ever now trusts to the examination of fresh, unstained blood in the diagnosis of malaria; nor are the chief methods of malaria control the introduction of species of aquatic plants, or the cultivation of clover. Also no one could recognise any form of *Entamœba histolytica* from the description given. These however are minor points in what is obviously a student's cram book for examination purposes.]

The books are well bound and of a convenient size for the pocket. The numerous new editions in the "Aids" series are sufficient evidence of their popularity.

R. K.

AIDS TO TROPICAL DISEASES.—By C. Ramachandran, L.M.P., L.C.P.S., L.T.M., Assistant to the Director of the Medical Unit, Govt. Royapuram Hospital. Pp. 108; paper covers. Madras: Messrs. B. G. Paul & Co., 1930. Price, Re. 1.

THIS small work will probably prove of interest to medical students throughout India. It is very brief and curt in style, but such qualities are required in a student's revision handbook. On the whole, the author has done his work of abstraction and condensation well; the matter is up to date, and we could find no obvious mistakes. The exceedingly low price of the book will make an appeal to poorer students, for there is an amazing amount of (correct) information packed into its small compass. Spelling mistakes are numerous, however, and should be corrected in a second edition.

R. K.

Annual Reports.

ADMINISTRATION REPORT OF THE MUNICIPAL COMMISSIONER FOR THE CITY OF BOMBAY FOR THE YEAR 1929-30. VOL. II. ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER FOR 1929. BOMBAY: THE TIMES OF INDIA PRESS. 1930.

BOMBAY covers an area of 23.34 square miles. Its population in 1921 was 1,175,914. Since 1922 estimations of population have been made yearly calculated on the increase between 1911–21. The report states however that there is reason to believe that the rate of increase between 1911 and 1921 has not been maintained since the later date and the estimated population of 1927 has been used for 1929 and will be continued unaltered until the 1931 census. On this basis the birth rate for 1929 was 18.6 per 1,000, a comparatively low birth rate for India; the reasons are probably to be found in the large male population and in the fact that many women go to their village homes for their confinements. As in the case in Calcutta, most of the births are registered in the last half of the year.

The *death rate* per 1,000 was 20.4, the lowest since 1872. The census of 1921 showed that 66 per cent. of the population of Bombay live in one-roomed tenements. An interesting analysis shows that the age group 10–15 gives the lowest percentage of mortality and that from birth up to 30 years of age, the female death rates are higher than the male, but after 30 the reverse is the case. Out of 26,555 deaths, certificates of death

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were received in only 9,259 cases. Of these more than half came from hospitals; so that amongst the general public not dying in hospitals, less than 10 per cent. of deaths were certified. The number of certificates however is increasing year by year. As elsewhere in India, respiratory diseases (12.7 per 1,000) easily head the list of causes of death; congenital debility and diseases of early infancy come next (2), malaria, ague and remittent fevers are third (1.4) and fourth comes tuberculosis (1.2).

The infantile mortality rate was 298 per 1,000 registered births which shows a decrease on 1928 and the 10 years average. 73 per cent. of infant deaths were due to respiratory disease, infantile debility and premature birth; diarrhœa and convulsions constitute most of the other deaths. Over one-third of the infant deaths takes place in the first month of life and one-fifth in the first week. In the remaining 11 months of the first year respiratory affections constitute the largest proportion of deaths. Allowance for the high rates in Bombay must be made for the fact that many women go to their own homes for their confinements but bring their babies back after a month or so. Deaths in such babies inflate the infant mortality rate unduly, because they are in the numerator as a death but not in the denominator as a registered birth. In addition to poverty and ignorance, the Health Officer ascribes malaria as an added factor in the production of the high infant mortality rate in Bombay.

The highest percentage of infant deaths take place in one-roomed houses. From the practical aspect a good deal is done: 10 municipal nurses who are qualified midwives visit daily the chawls and houses of the poor; give advice and help of various sort and advise women to go to maternity homes for their confinement; if they do not they attend them in their houses, providing bedding and a few comforts. This is most excellent work and must be doing a great deal of good. Maternity homes are 4 in number with 125 beds and 3,051 women were confined in them. There are 9 Maternity and Child Welfare centres under a Society which are doing very good work indeed.

Plague was negligible during 1929, only 36 cases being recorded. 638,013 rats were collected and destroyed. 266,187 were examined at Parel and 512 found infected—about one-fourth of the proportion found infected in 1928.

Small-pox was prevalent, causing 0.9 per 1,000 mortality.

Cholera caused only 18 deaths.

Tuberculosis is a very serious factor and problem: 1,520 deaths were reported, giving a rate of 1.2 per 1,000: 1,335 were due to phthisis. The death rate appears to be fairly constant from year to year. There are two dispensaries for out-patients and a sanatorium of 32 beds for in-patients. There is a museum at the head-quarters of the Anti-Tuberculosis Association where exhibits and literature are available to the public.

Malaria along with ague and remittent fever caused a recorded death rate of 1.4 per 1,000—higher than tuberculosis therefore. No mention is made of Major Covell's report on malaria but a considerable amount of anti-malarial work is reported. Systematic inspections of areas are made every week; breeding places treated and action against house owners instituted when necessary. The spleen rate for the whole city is 7.8 per cent. Some areas show rates of 16 and 14.

Parasite rates though not done on large numbers are as high as 56 per cent. in certain areas. The incidence of malaria amongst British troops in Bombay is 200 per 1,000, but the Medical Officer of Health is of opinion that the figures do not show any increase in malaria at Colaba due to the reclamation of Back Bay. The records of examination of wells, cisterns and tanks bear testimony to the activity of the staff.

Venereal disease.—A league for combating venereal diseases with an information bureau and clinic was started under voluntary management in 1918 but has now been taken over by the municipality. 3,000 cases were seen during the year and propaganda work carried on. The usual discouraging report about patients leaving off before undergoing a full course of treatment is given, but a large amount of very good work is being done.

Medical relief.—There are 13 dispensaries for relief to the poor.

Milk supply.—For many years the Corporation have had a scheme for transferring all the buffalo stables of the city outside but legal difficulties have apparently stood in the way—these should be remedied by law. The milk produced provides an average of 3.1 ounces per head per day. The Medical Officer of Health considers this an inadequate average for a population largely vegetarian. 78 per cent. of the milk comes from the stables within the city. A great deal of skimmed milk from Gujrat has formalin and boracic acid added as preservatives. Systematic examination is done at stations to detect such consignments which are destroyed.

Everyone who knows Bombay knows the awful abomination of "basket privies" which pollute every alleyway. It is satisfactory to hear that the problem has been attacked from a fresh standpoint. Since 1928, when an owner has been served with a notice calling for the conversion of the basket privies on his premises, he receives a subvention of Rs. 100 for every seat converted, provided the work was completed within 3 months. If not done, no subvention is paid and the work is carried out at the owner's expense by the Corporation. During 1929, 8,246 seats were converted. The seats remaining to be converted in the sewered areas are about 30,000. If this rate of conversion is continued the sewered areas of the city should be rid of these dangerous and obnoxious nuisances within 3 or 4 years. This is an excellent improvement and the Corporation are to be congratulated on the steps taken.

One of the main difficulties about environmental improvement in Indian cities is that of housing. The Bombay Improvement Trust has been at work for some years and many insanitary areas have been acquired and demolished but apparently the number of sanitary dwellings built to replace these has not kept the necessary pace with demolition. Under the Development Directorate Scheme however 207 new chawls have been erected for the working classes. The improvement of defects in housing by inspection and notices is being carried out systematically. Each inspector examines 5 houses per week. Second visits are paid to see that the requirements are enforced.

The report of the Arthur Road Infectious Diseases Hospital contains some interesting points. The new treatment of small-pox with xylol was tried but no special beneficial effects noted.

Dr. Patel is of opinion that scarlet fever occurs in Bombay in an appreciable number of cases. Anti-scarletina serum was tried with benefit in a septic case.

The Maratha Plague Hospital reports the treatment of plague with tincture iodi. m x, camphor gr. v, thymol gr. v. intravenously morning and evening with recovery. Mercurochrome was unsuccessful.

Tuberculosis.—Into the Maratha Hospital there were admitted 495 cases of advanced tuberculosis for isolation. These cases were naturally unsuitable for treatment but solganol, lopion and sanocrysin were tried and improvement to some extent noted. Collosal antimony in some cases seemed to reduce septicity.

In the Municipal Laboratory 12,757 samples of various sorts were examined. Interesting points were: one-third of the samples of milk examined were adulterated; under the Adulteration Act 38 per cent. of ghee samples were found to be adulterated.

The samples of drinking water examined were all of a high standard of bacteriological purity, we believe that all the tap water is chlorinated, though we found no reference to the fact in the report.

95 per cent. of the Haj pilgrims leaving Bombay were vaccinated prior to embarkation.. It is noteworthy that there was no prosecution in Bombay under the

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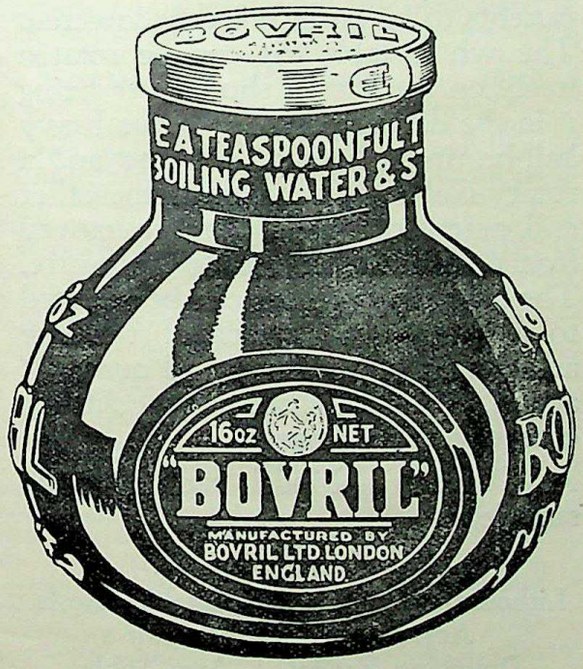

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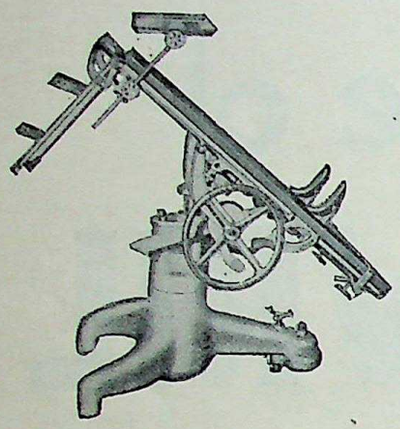

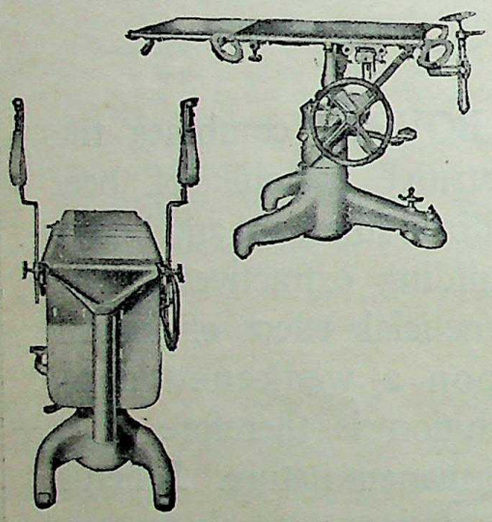

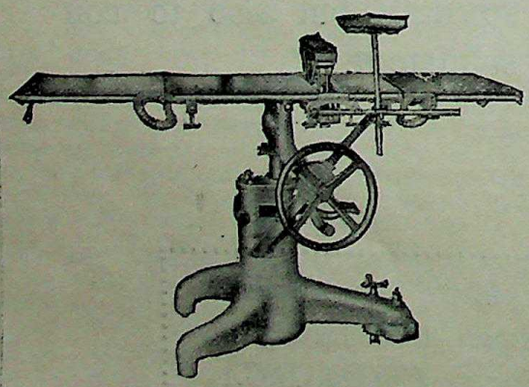

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Vaccination Act for failure to bring infants for vaccination or failure to present them for inspection. 14,619 primary vaccinations in infants under 1 year were done; the number of registered births was 24,220. We read the report with interest and there is much evidence of honest routine good sanitary work, which after all is the thing that counts.

A. D. S.

REPORT OF THE HEALTH OFFICER OF CALCUTTA FOR THE YEAR 1928. BY DR. T. N. MAJUMDAR, D.P.H., D.T.M., F.C.S. (LOND.), F.R.S. (EDIN.). CALCUTTA: PRINTED AT THE CORPORATION PRESS.

THE Calcutta Municipal Act of 1921 gave the Corporation of Calcutta very wide powers in health matters and the Report under review illustrates the activities of the Corporation and its Health Department. The Report is divided into sections comprising:—

Meteorology and Vital Statistics, Principal causes of deaths, Sanitation, Food and drink, Medical relief, Vaccination, Disposal of the dead, and a report on the working of the Corporation Laboratory. The Report is illustrated by numerous diagrams and charts and there is a wealth of numerical and statistical information.

Vital statistics.—Calcutta municipal area is spread over an area of 30½ square miles. Its population in the 1921 Census figure was 1,077,264 and this figure is used for calculating the various mortality and other rates from 1921 onwards until the next census. The birth rate is 20.4 per 1,000. This is about the average, but higher than last year's (15.5). There are twice as many males as females in Calcutta which accounts for its comparatively low birth rate in comparison with other towns and the country as a whole. Even out of the females between 15 and 20 years of age (135,534) in 1921, it is calculated that there are 15,000 widows and 20,000 prostitutes.

Death rate.—The death per 1,000 in 1928 was 31.6 on the whole area and 30.8 in the town without the added areas of Cossipore and Garden Reach. This represents a slight fall on last year's figure and is welcome as the crude death rate had shown signs of an upward trend for several years previously. 1,880 of the total deaths occurred in persons from outside Calcutta. On comparing the principal causes of death with 1927, cholera was higher in 1928, small-pox was less, while tuberculosis, dysentery, kala-azar and other fevers showed a definite decrease. There was an epidemic of measles however which added to the mortality from that disease. An interesting diagram is given of the distribution of mortality rates in the various wards. Entally (61.4) and Tollygunge (51.2) had very high death rates. Burra Bazar and Tangra had low rates. Other areas were intermediate. Manicktolla and Kidderpore have high rates. Respiratory disease accounts for most of the mortality. Intestinal disease and tuberculosis come next in order. So far as communities are concerned the Hindus and the Mahommedans are about equal, Indian Christians showing the lowest mortality rates. The seasonal mortality curve is interesting. The highest points are reached in December, March and April (with a slight drop between December and March) and the lowest in June, July, August and September, after which the curve rises steadily up to December again. It is interesting to note that the added areas of Cossipore and Garden Reach have increased the mortality rate of the city as a whole in malaria and cholera.

The infant mortality rate was 270 per 1,000 births. This shows a decrease over the 4 previous years. The main causes of infant deaths are given as bronchitis, congenital debility, and premature birth; tetanus neonatorum causes 8 per cent. of the deaths and is practically never seen in the practice of the Corporation midwives. Half of the infantile mortality occurs in babies under 1 month old. The figure is highest amongst the Mahommedans (393).

Cholera followed the usual seasonal incidence: viz., a high peak in March, April and May, followed by a sudden drop with a rise again in October and November. The cholera mortality trend in Calcutta is apparently upwards at present. Cholera is always worst in the riparian wards, and is practically a disease of the Hindus in Calcutta. It is noteworthy how often outbreaks of cholera followed closely on the 7 principal bathing festivals of Calcutta. A special cholera hospital was opened and cured 81.1 per cent. out of 566 admitted. About 40,000 inoculations were performed.

Small-pox.—1928 was a comparatively mild year. The outbreak of measles has already been noted. The outbreak was worst in March, April and May.

Enteric fever.—866 deaths occurred (0.8 per 1,000). This disease in Calcutta appears in the spring and autumn months. Here again the Hindus suffered more comparatively than the Mahommedans. The causes of the large number of cases are ill-defined and difficult to apportion or investigate. The recorded deaths from *malaria* were 1,345 or 1.2 per 1,000. From the figures given Entally, Beniapukur and Garden Reach would appear to be the most malarious and Ballygunge the least so. But the combined fever rates (malaria plus other fevers) put Ballygunge in the front three with the highest fever mortality. Mahommedans give a much higher mortality from malaria than the Hindus. No reason is assigned for this except increased susceptibility. The whole question of malaria in Calcutta could well bear closer investigation. It is undoubtedly largely a *stephensi* infection.

Dysentery and diarrhœa.—Under this head is an item "sutika," a puerperal diarrhœa which is undoubtedly recognised as a definite cause of mortality. This is not one of the ordinary puerperal diseases in the textbooks. *Intestinal diseases* in Calcutta speaking generally are more prevalent in the cold weather in the earlier part of the year and drop down in real hot weather, to rise again in the rains to a peak in December. They are commonest in the suburban areas "where there are numerous service privies, no sewers and where the supply of filtered water to the bustees is totally inadequate." Surely this is a piece of primary environmental sanitation which should take precedence of everything else—no advance of any sort is possible until these crying elementary defects are put right.

Tuberculosis.—The mortality from this is 2.6 per 1,000. The recorded figures from this disease have remained pretty much at the same figure for the last 10 years, with a slight tendency to increase. It is higher amongst Mahommedans than Hindus and the saddest feature, as Dr. Majumdar says, is the mortality amongst young females between 15 and 30. It is between 3 and 4 times as high as in males of the same ages. The mortality is appalling at these ages. Early marriage and early and repeated pregnancies are given as the main causes. Dr. Majumdar reckons there are 15,000 cases of tuberculosis in Calcutta and in the majority of cases no precautions to prevent spread of infection are taken.

Respiratory diseases.—These provide the highest mortality in Calcutta. The mortality is low in the rains and rapidly rises in the cold weather. The suburban areas are again the highest sufferers. The mortality in Entally ward alone is 19.1 per 1,000.

Kala-azar is on the wane as a cause of mortality in Calcutta—447 deaths occurred with a mortality of 0.49 per 1,000. Indian Christians are the worst sufferers and Kidderpore and Tollygunge give the highest mortalities.

Section III records the work done by the Sanitary Staff in inspecting and notifying sanitary defects in houses, lands, markets and cattle sheds. 22 men work as Sanitary Officers—their status is not shown. 6,493 notices were disposed of. Rs. 52,216 were realised as fines for non-compliance. There is no doubt that these inspections have resulted in much improvement. The Corporation controls 2 large "dhobi-khanas."

Eleven food inspectors were employed during the year. This does not seem a very large number considering the size of Calcutta and the number of markets

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and shops which sell food and drink. The Co-operative Milk Societies Union receives a grant from the Calcutta Corporation and are under contract to supply 400 maunds of milk per day at 3 seers per rupee to the public. Bakeries generally would seem to require improvement. Many of them have no provision for a filtered water supply, in fact in some districts the majority have not.

Forty-six aerated water factories exist in Calcutta and are regularly inspected.

A large amount of medical relief is given. Under the Corporation 16 dispensaries exist and 116,237 patients were treated.

Twenty-eight Ward Health Associations seem to be doing very good work in the city by affording medical relief and taking prevention against epidemics and assisting in propaganda work in their areas.

The Maternity Homes, 3 in number, must be very beneficial to the communities whom they serve. In addition there are 7 maternity centres and 5 Lady Health Visitors are attached to these. The record of work done is excellent.

Disposal of the dead.—There are 5 burning ghats, a crematorium, 3 Hindu burial grounds, 9 cemeteries and several Mahommedan burial grounds, as well as a tower of silence, Jewish and Chinese cemeteries. These illustrate the cosmopolitan nature of Calcutta's population.

The report of the Corporation Laboratory under Dr. T. K. Ghosh has some interesting points.

5,639 samples of food were analysed; the percentage of adulteration was 14.7, a reduction from last year's figures. 17.5 per cent. of ghi samples were adulterated and nearly one-fourth of the milk samples likewise were adulterated. These are high figures. The value of bacteriological examination of water is shown by an investigation into the cause of a sediment which appeared in the tap water of certain areas. A report on an outbreak of food poisoning is given but unfortunately no bacteriological examination seems to have been carried out.

An explosion in a sewer is ascribed to the evolution of sulphuretted hydrogen in a blocked sewer.

Dr. Majumdar's whole report bears evidence of the large amount of constant and careful work carried on throughout the year. We hope the important matters referred to in the report will receive the practical attention of the Corporation. The improvement of the outlying areas in the matter of drainage, sewerage, and the provision of an adequate filtered water is a matter of fundamental sanitary importance and should be treated at once to the exclusion of other schemes.

A. D. S.

FIFTH ANNUAL REPORT OF THE PASTEUR INSTITUTE, CALCUTTA, FOR THE YEAR 1928. BY MAJOR E. C. R. FOX, I.M.D. CALCUTTA: BENGAL SECRETARIAT BOOK DEPOT. PRICE, Re. 1-11.

DESPITE its extremely cramped quarters, the Pasteur Institute of Calcutta continues to carry on an extremely extensive programme of antirabic treatment. In 1928 no less than 9,576 persons attended—a record for any institute in India or anywhere else; of these 7,529 received a full course of antirabic treatment. The total hydrophobia rate was 0.72 per cent. and the failure rate 0.39 per cent.—figures which bear a most striking testimony to the success of the vaccine made from carbolised sheep's brain fixed virus. No less than 18 patients were sent who had already developed hydrophobia; these, of course, were not treated; one of them was a case of dumb rabies—an unusual result after infection with "street virus." The table on p. 6 of the report furnishes further figures as to the success of the sheep's brain virus; in class III—deep bites on the trunk and extremities—the hydrophobia rate in 3,293 persons treated was only 0.58 per cent.; and in class IV—extensive deep bites, and bites on the face and head—the total hydrophobia rate in 1,175 persons treated was only 1.96 per cent.—(as against a customary figure of about 5 to 6 per cent. for most other Pasteur institutes elsewhere).

Major Fox is to be congratulated on a further year of most successful work under most difficult conditions of want of space. We are glad to know that the Government of Bengal have sanctioned the proposal for a new wing to the Calcutta School of Tropical Medicine, which will provide suitable accommodation for the Pasteur Institute of Calcutta; but we fear that funds for its construction may not be available for some time to come.

Correspondence.

"PSITTACOSIS OR TYPHOID FEVER?"

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In reply to a letter in the October issue of the *Indian Medical Gazette,* p. 600, headed "Psittacosis or Typhoid Fever?" may I be permitted to remark that there seems to be nothing in the clinical picture of his cases, as described by Dr. Asutosh Paul, that is incompatible with the diagnosis of typhoid, or at any rate one of the fevers of the enteric group? In an experience of medical work in India of well over 30 years, I have seen at least as many, if not more, cases of typhoid fever in which constipation was a marked symptom, as cases showing the typical diarrhœa of the textbooks. Bronchitis is in this country so common a complication of enteric fever that one is always on the look out for it in the second or third week, and I have more than once seen a definite pneumonia as a complication. I do not think cases are rare in which there are no definite gastro-intestinal symptoms, and no clinical signs except the course of the fever as shown by the temperature chart to indicate the nature of the illness. The pulse in such cases is usually slow in proportion to the temperature. Dr. Paul makes no mention of this in the account of his cases; but in the absence of any definite history of infection from birds of the parrot kind it seems reasonable to diagnose them as enteric fever.—Yours, etc.,

E. M. FARRER, M.B., B.S. (Lond.).

FARRER HOSPITAL,
BHIWANI, PUNJAB, INDIA,
15th November, 1930.

REFLEX ASTHMA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case is of interest from the ætiological point of view of bronchial asthma.

A Hindu lady aged about 60 years came to the hospital to get her ears syringed for the removal of wax. By mistake cold boracic lotion was used for the purpose of cleansing. Within about five minutes the old lady got a fit of typical bronchial asthma which was relieved by a subcutaneous injection of 0.5 c.c. of adrenalin. On enquiry I learnt that she was a chronic asthmatic subject.

Thinking that she was hypersensitive to boracic acid, i.e., of an allergic nature, I made cutaneous and ophthalmic tests for the same on the next day. Both of them were negative. I douched her ears with warm water and put in a little boracic acid. I waited for about half an hour and found no abnormal change in her. I then used cold water to remove the powder and again within about five minutes she got an asthmatic fit, which was again relieved by 0.5 c.c. of adrenalin.

I may point out that as a rule I do not syringe ears, but douche them, keeping the can about half to one foot above the level of the ears.—Yours, etc.,

M. ABDULLA, L.M. & S. (Hyd.), L.C.P. & S. (Bomb.).

MUNICIPAL HOSPITAL,
VANIYAMBADI, NORTH ARCOT,
27th October, 1930.

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IRRADOL, P. D. & CO.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In connection with your note on p. 602 on Irradol (P. D. & Co.), we deem it advisable to inform you that the concentration has been increased from one hundred times the antirachitic potency to two hundred and fifty times that of high grade cod-liver oil. There is no change in the package or the price and the dosage also remains the same.

The reason for this increase in concentration is that accumulated clinical evidence in connection with the treatment of rickets has shown that a larger amount of vitamin D is required in the form of Irradol than is true of this vitamin when given as cod-liver oil. There remains some unexplained difference in vitamin D prepared synthetically as compared with vitamin D naturally contained in cod-liver oil, and observation so far reported indicates that it takes about two and a half times of the former to produce the same clinical results, hence the increase from 100 D. to 250 D.

In view of the importance of this product may we ask you to insert a small notice in your next issue advising your readers of this change?—Yours, etc.,

PARKE, DAVIS AND COMPANY.

BOMBAY (INDIA),
12*th November,* 1930.

THE EARLIEST RECORD OF CÆSAREAN SECTION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In Faredoon Marzban's translation of *Shah-Namo,* the great authentic Persian history and epic, the author, Firdausi, describes what is probably the first authentic record of a Cæsarean section. This occurred in connection with the birth of Rustom, the Persian Hercules of a pre-historic age (about 5000 B.C.*). The passage runs as follows:—

"The mother, Rodabe, not being able to effect delivery and being in great pain and danger of life, was operated on by a 'wise man' on the advice of Shahmurg, the father of Zal. He (the 'wise man') made the mother unconscious by a stiff dose of wine, then made an incision in the abdomen and womb and delivered the child, which was found to be abnormal in size and weight. The wounds were stitched up and a herb applied, and they healed up very quickly. All were amazed at the result of such a delivery, a mode of delivery never before effected thus."—Yours, etc.,

R. K. WADIA, M.B., B.SC.

275, BOWBAZAR STREET,
CALCUTTA,
1*st November,* 1930.

*That is to say about 1,000 years before the period of Zoroaster, the Parsees' prophet. The consensus of opinion, including that of the Greek writers, ascribes Zoroaster's period to about 4000 B.C.

SPONTANEOUS HÆMORRHAGE IN THE NEW BORN.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In view of the cases published in the *British Medical Journal* of this condition during the last few months I thought the following might be of interest to your readers:—

I was called at 11 a.m. on the 6th September, 1930, by Dr. Karmarker to see a newly born child.

He informed me that the child had been born two hours previously and almost immediately after birth it started bleeding from the mouth.

I took a sterile syringe with me and went to the house of the parents. I found a female child, blue and almost pulseless, with red blood trickling from the mouth. On turning the child on its side there was quite a gush of blood.

I took 5 c.c. of blood from the mother's Indian basilic vein and immediately injected it into the child's buttock.

The result was dramatic; in 15 minutes or so the child's condition had improved and by the evening her colour was normal with a strong pulse. No further injection or drugs were needed.

The father and mother are Parsees and perfectly healthy and this was their first child; the labour was normal with no interference.

For three days following birth the motions were dark and tarry, but of course this may have been due to the presence of meconium.

I must thank Major R. L. Vance, I.M.S., Civil Surgeon, Quetta, for permission to report this case.—Yours, etc.,

ASSISTANT SURGEON D. S. JACKSON,
M.R.C.S., L.R.C.P., D.T.M. & H.,
Assistant to the Civil Surgeon.

CIVIL HOSPITAL,
QUETTA,
24*th October,* 1930.

Service Notes.

APPOINTMENT AND TRANSFERS.

COLONEL W. V. COPPINGER, C.I.E., D.S.O., M.D., F.R.C.S.I., Inspector-General of Civil Hospitals, Central Provinces, has been appointed as Surgeon-General with the Government of Bengal, with effect from the 5th November, 1930.

The Governor in Council is pleased to appoint Colonel W. V. Coppinger, C.I.E., D.S.O., M.D., I.M.S., as President of the Bengal Council of Medical Registration, *vice* Lieutenant-Colonel H. B. Steen, M.D., M.Ch., M.A.O., I.M.S., resigned.

Lieutenant-Colonel R. N. Chopra, M.A., M.D. (Cantab.), I.M.S., Chairman of the Drugs Enquiry Committee, assumed charge of his duties on the Committee on the 1st October, 1930.

Lieutenant-Colonel F. Stevenson, I.M.S., an Agency Surgeon, has been posted as Legation Surgeon, Nepal, and *ex-officio* Assistant to the British Envoy of Nepal, with effect from the 27th October, 1930.

On return from leave Lieutenant-Colonel J. B. Lapsley, M.C., has been appointed as Officer-in-Charge, Medical Store Depôt, Lahore Cantonment, with effect from the 27th October, 1930, afternoon.

On return from leave Lieutenant-Colonel E. W. O'G. Kirwan, I.M.S., is appointed to act as Professor of Ophthalmic Surgery, Medical College, Calcutta, and Ophthalmic Surgeon to the College Hospitals, with effect from the 27th October, 1930.

On relief by Lieutenant-Colonel A. F. Hamilton, C.I.E., F.R.C.S. (Eng.), I.M.S., Major W. C. Spackman, M.B., B.S. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.C.S.E., D.T.M. (Lond.), I.M.S., to officiate as Civil Surgeon, Surat.

Major W. M. Will, on transfer from the Medical Store Depôt, Lahore Cantonment, has been appointed as Officer-in-Charge of the Medical Store Depôt, Calcutta, with effect from the 3rd November, 1930, forenoon.

LEAVE.

Lieutenant-Colonel C. H. Smith, O.B.E., I.M.S., an Agency Surgeon, has been granted, under Fundamental Rules, leave on average pay for 8 months combined with leave on half average pay for 1 year and 4 months, with effect from the 4th October, 1930.

Lieutenant-Colonel T. L. Bomford, M.D., I.M.S., Civil Surgeon, Dacca, is granted leave for 1 year, with effect from the 26th October, 1930.

Lieutenant-Colonel Steen, M.D., I.M.S., is granted leave for 6 months and 18 days.

In modification of Government Notification No. S. 20|3, dated the 23rd September, 1930, Major L. A. P. Anderson, M.D., I.M.S., Officiating Director, Haffkine Institute, Bombay, is granted leave on

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average pay for 8 months, with effect from the 7th November, 1930, the date of return of Brevet-Colonel F. P. Mackie, O.B.E., K.H.P., M.D., M.SC. (Bristol), F.R.C.P. (Lond.), F.R.C.S. (Eng.), D.P.H., I.M.S., or from the date of availing.

Major P. C. Banerjee, I.M.S., Civil Surgeon, Howrah, is granted leave for 1 year, with effect from the date of availing.

RETIREMENTS.

Major-General A. Hooton, C.I.E. 16th February, 1930.

Major-General Sir T. H. Symons, K.B.E., C.S.I., K.H.S. 15th September, 1930.

Colonel H. Ainsworth, M.B., F.R.C.S. 4th May, 1927.

Colonel A. W. R. Cochrane, M.B., F.R.C.S. 8th February, 1929.

Colonel M. MacKelvie, C.I.E., M.B., F.R.C.S.E. 17th October, 1930.

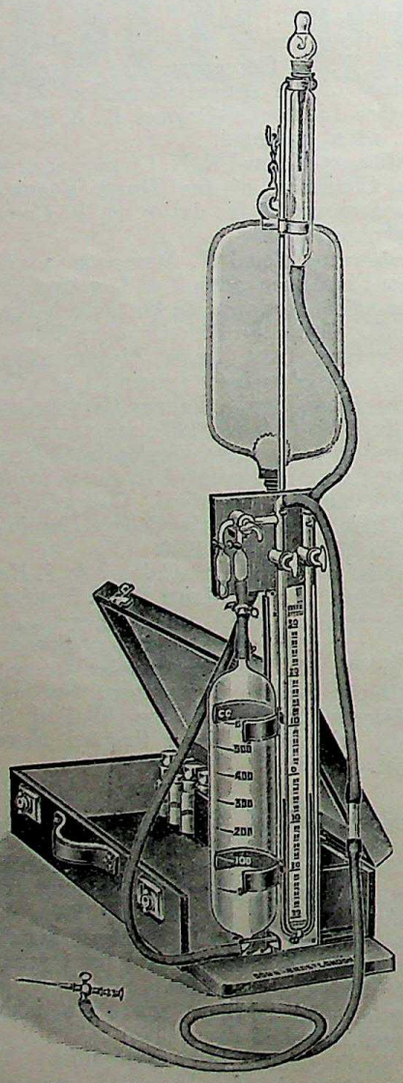
Lieutenant-Colonel R. Kelsall, D.S.O., M.D. 18th October, 1930.

Notes.

A NEW PNEUMOTHORAX APPARATUS.

By DR. GEOFFRY MARSHALL, O.B.E., M.D., F.R.C.P., 31, *Wimpole Street, London, W.*1.

THIS is a modification of the apparatus described in 1921. In my former model the air reservoir consisted of a collapsible India-rubber bag. This has now been



replaced by a glass cylinder graduated up to 600 c.c. The lower end of this cylinder communicates by flexible tubing with a stout rubber bag of the "hot-water bottle" type. This bag is of the same capacity as the cylinder, and is filled with water. When ready for use the bag is suspended by means of a knotted silk cord, as shown in the figure, and on turning the glass two-way tap the water runs into the lower end of the glass cylinder, displacing the air which is driven into the flexible tube attached to the needle: the rate of flow is governed by a screw clip at the top of the cylinder. There are three glass bulbs containing sterile wool to filter the air, and a trap prevents loss of water from the manometer in the event of the patient coughing during the operation. Fitted in the case are four bottles for novocaine, iodine solution, etc., also room for pneumothorax needles and syringe for injecting the local anæsthetic. The manometer registers intrapleural pressure, or pressure at which the gas is being injected, according to the position of the two-way tap. The apparatus can be used for both injection and withdrawal of measured quantities of gas, and its advantages are that it is easy to handle, it is light and compact, and it can be carried in any position. The weight of the apparatus is 7¾ lbs., and the measurements of the case are 19½ × 9 × 4½ ins. The apparatus is made by Messrs. Down Brothers, Ltd., 21 and 23, St. Thomas' Street, London, S.E. 1.

TESTS FOR STOCK SOLUTIONS OF QUININE AND POTASSIUM IODIDE.

OUR readers may remember that last year—(*Indian Med. Gaz.*, July, 1929, p. 378)—Colonel (now Major-General) J. W. D. Megaw, I.M.S., and Mr. H. Hawley, M.SC., described a simple apparatus for testing the strength of stock mixtures of quinine and potassium iodide. The apparatus described in that article has now been made up and put into a very portable and compact case by Messrs. Boots & Co., and is advertised on p. xxix of the present issue. The case is a very neat one, and many of our readers may be interested in it.

THE DANGERS OF INDISCRIMINATE IRRADIATION.

SINCE it became known that vitamine D is produced in fatty foods by the action of ultra-violet rays, many enthusiasts have endeavoured to "activate" all manner of food-stuffs in this way, with results varying in degree of success according to the technique used.

It has been assumed that all that is necessary to make a food-stuff rich in vitamine D is to expose it to ultra-violet rays from some lamp, time of exposure, distance from the lamp and thickness of the layer of the food being determined according to the predilections of the worker concerned. This assumption is by no means justified; there are many factors involved, and much patient research is necessary before the correct conditions from any particular circumstances are determined.

The output of ultra-violet lamps varies greatly, and with certain types tends to fall off rapidly with time of burning; this factor has to be determined for the particular lamp used. The time of exposure is vital to the success of the experiment, and it is probably assumed by many that the longer the exposure the greater the amount of vitamine D produced. This is a complete fallacy. It has been shown that if the time of irradiation is prolonged beyond a certain point there will actually be destruction of the vitamine D already produced, so that the final result may be a food actually less rich in vitamine D at the end of the treatment than it was before.

The thickness of layer of the food, if it is a solid, is an important point. It is not always realised that the rays only penetrate about 1 millimetre below the surface of a solid, so that particles on the surface will probably be over-irradiated, while particles in the deeper parts of the layer will not be irradiated at all. The activation of the food is thus liable to be irregular. If the substance is dissolved in some liquid solvent, the suitability of the solvent has to be considered.

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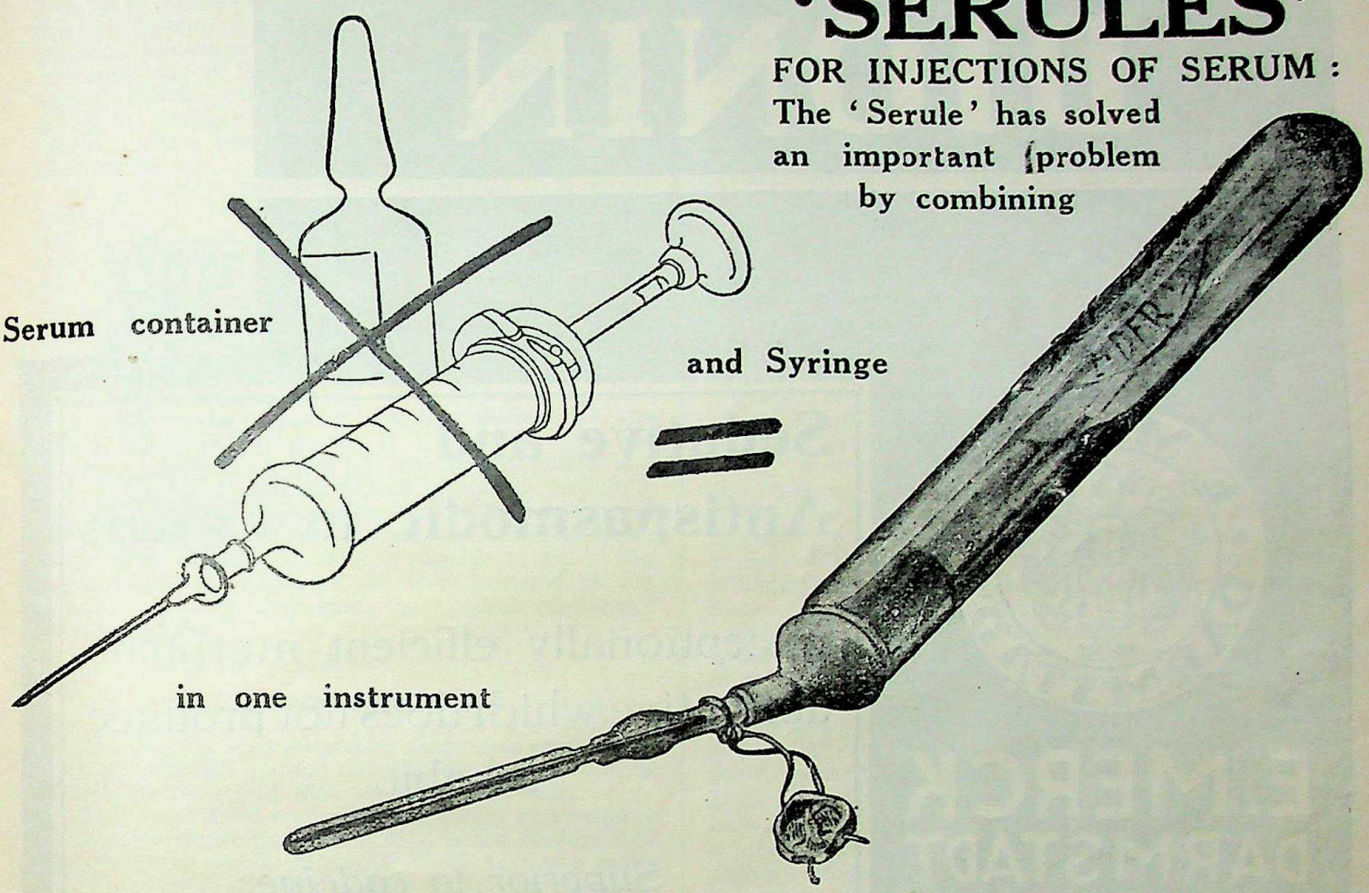
"Bayer-Meister Lucius"

'SERULES'

FOR INJECTIONS OF SERUM:
The 'Serule' has solved an important problem by combining



Available with purified or concentrated serum. Guaranteed sterile, ready for use and easy to handle.

The same qualities distinguish

the "VENULES."

It is the ideal automatic aspirating Syringe with container combined in a single instrument for taking samples of blood and body fluid.

Literature and full particulars on application:

"Bayer-Meister Lucius"

HAVERO TRADING CO., LTD.,
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DIONIN

E. MERCK
DARMSTADT

Sedative and Antispasmodic in Cough

Exceptionally efficient morphine derivative which does not produce a habit.

Superior to codeine in allaying irritation

DIONIN powder
Bottles of 1 gm. and 5 gm.

DIONIN tablets 0.03 gm.
Original tubes of 20 tablets.

DIONIN ampoules 0.05 gm.
Original 'Merck' boxes of 10 ampoules.

Further information may be obtained from the

Agents in India:—

MESSRS. MARTIN & HARRIS, LTD.,

Rowlette Building,
17, Prinsep Street,
CALCUTTA

119, Parsi Bazar Street
Fort,
BOMBAY

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It will be seen that the indiscriminate irradiation of foods is fraught with difficulties, and is not entirely without danger. The food may be given medicinally, in rickets, for instance, in which case, if the production of vitamine D has been inadequate no curative action will result, or if it has been excessive, there is a distinct danger of intestinal upset, or in very extreme cases, even of hypercalcæmia, that is excessive stimulation of calcium absorption with resultant deposit of lime in abnormal situations.

In any case it is absolutely vital that physiological standardisation of the irradiated food or medicinal substance be carried out, and this involves technique and facilities which cannot possibly be at the disposal of the "amateur."

This last point indicates how important it is to all concerned that the production of vitamine D by irradiation should only be carried out by organisations possessing the necessary laboratory equipment and trained personnel; without these the process becomes a mere groping, of no benefit, but rather a danger, to those in whose interests it is carried out.

It will be easily appreciated, therefore, that care should be exercised in the choice of irradiated preparations for prescription. The one prepared by the Steenbock process, namely Ostelin, satisfies all the conditions referred to above. It is prepared under the strictest laboratory control by qualified chemists, and is physiologically standardised by a special technique which ensures that every batch has constant and maximum vitamine D potency. Ostelin is claimed to be as nearly pure vitamine D as it is possible to get in the present state of knowledge, for it is prepared by the irradiation of pure ergosterol, the "parent substance" of vitamine D.

KELLOGG CEREALS.

THE following is an interesting account of present-day factory conditions of food manufacture in the U. S. A. It may be contrasted with conditions in India.

"One of the finest examples of efficiency and progress in the hygienic preparation of food is the Kellogg factory at Battle Creek, Michigan, U. S. A., where much of the cereal food eaten in this country is prepared. It is claimed that the Kellogg Company is the largest manufacturer of ready-to-eat breakfast cereal in the world.

Perhaps no higher point of cleanliness than that found in this factory has ever been reached. Materials are transported from one process to another by mechanical conveyors. Food-stuffs are practically never touched by human hands. All possible care has also been taken to insure the cleanliness and health of those who are employed. Shower baths, rest rooms and modern toilet facilities are provided. Everyone must wear a uniform while working, street clothes are not allowed. The uniforms are washed, free of charge, in a company laundry.

A thorough belief in the principle advertised by Kellogg that wholesome food is necessary for good health and happiness has led the Company to establish a restaurant on the factory premises where employees may obtain the best at low cost. In the modern kitchen connected with the restaurant, all recipes distributed to Kellogg cereal users are tested beforehand.

Another unusual feature is the emergency hospital with a trained nurse in charge both day and night. A competent physician is also employed whose duty is to look after the general health and welfare of all employees. For the children of women who are employed, a pleasant nursery has been established. Here in a happy, sunlit room a score of children may be found each day, playing under ideal conditions. Games and toys are provided. There are blackboards to write upon. A phonograph furnishes music. A nutritious meal is served at noon. Overseeing the activities of the children is a trained kindergarten teacher. The doctor co-operates by examining them regularly, thus insuring health. Luxurious homes could provide nothing better, yet this service is entirely free of charge.

A playground equipped with sand-boxes, swings and slides is located in the athletic field nearby. This field is one of the finest in the state of Michigan and is maintained by the Kellogg Company for employees' entertainment and physical welfare. For indoor entertainment there is a large social hall. Here dances and entertainments are given regularly. It is a huge auditorium beautifully decorated and furnished with a stage for theatricals."

BRITISH MEDICAL ASSOCIATION AND CANADIAN MEDICAL ASSOCIATION MEETING, WINNIPEG, AUGUST 26TH—29TH, 1930.

A PROMINENT feature of the Burroughs, Wellcome & Co. exhibit held in connection with the British Medical Association and Canadian Medical Association Meeting, Winnipeg, was the series of large-scale photomicrographs of the causative organisms of certain diseases. Around these were grouped the products used in the diagnosis, prophylaxis and treatment of the diseases concerned.

Charts and feeding tests displayed regarding the vitamin content of "Kepler" Cod Liver Oil with Malt Extract, "Kepler" Malt Extract, and combinations, clearly demonstrated how these products supplement the ordinary diet with vitamins A, B and D. Two strengths of "Tabloid" Irradiated Ergosterol were also displayed, one of 0.15 milligramme for supplementing a diet which already contains vitamin D, and a one milligramme strength intended for the intensive treatment of serious cases of rickets.

Ephedra (*Ma Huang*) the source of the alkaloid ephedrine, which is successfully used in the treatment of asthma, hay-fever, bronchitis and whooping cough, was also shown, and the elaborate precautions taken to ensure freedom from pseudo-ephedrine and other subsidiary alkaloids, of which l-methylephedrine and nor-d-ψ-ephedrine were discovered in *Ma Huang* by Burroughs, Wellcome & Co., amply demonstrated the high standard of purity set by this firm. A kymograph contrasted the effects of ephedrine and adrenalin and clearly showed that Burroughs, Wellcome & Co. ephedrine preparations are of definite efficiency.

Of particular interest were the dioramas illustrating incidents in which "Tabloid" Medical and First Aid Outfits proved their worth, including those of Stanley in Africa, Peary at the North Pole, Capt. Scott's Expedition to the Antarctic, Amundsen at the South Pole, members of the Mount Everest Expedition at the main camp on the Rongbuk Glacier with Mount Everest in the distance, Ross Smith on his flight to Australia and the U. S. A. Army Round-the-World Flight.

A selection of herbarium specimens from the Wellcome Materia Medica Farm, Dartford, Kent, England, not only reminded pharmacists of student days, but served to show that many medicinal plants grown in England reach a standard of perfection unequalled elsewhere.

"LEUKOPLAST."

IN *Die Therapie der Gegenwart*, issue 9/10, Sanitätsrat, Dr. Augener comments on his experiences as a ship's doctor with "Leukoplast"—an adhesive plaster—under tropical conditions. His ship spent a period of nine weeks in West Africa, during which time some 70 coolies were loading her. Minor and major injuries were not infrequent, and, in his experience, "Leukoplast" gave admirable results; it was superior to ordinary adhesive plaster, caused no irritation, and withstood monsoon rains. Wounds dressed with this dressing remained clean, free from irritation, and could be left for days together without the dressing being changed.

The Indian agents are Messrs. H. E. Metzkes & Co., 11, Esplanade, East, Calcutta, and they will be glad to furnish information and price lists on application.

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MESSRS. ALLEN & HANBURY'S REFERENCE LIST OF SURGICAL INSTRUMENTS, APPLIANCES AND HOSPITAL EQUIPMENT. 1930.

THIS is a wonderful publication; it runs to over 2,000 pages, is sumptuously illustrated, and sumptuously bound. We are informed that more than £20,000 were expended on its publication, the illustrations alone costing more than £10,000. Every possible line of instruments, equipment, and hospital furniture, etc., is included and profusely illustrated. A very special feature of Messrs. Allen & Hanbury's instruments is their extensive use of stainless steel as their standard material for practically their entire range of instruments —only a few being now made of carbon steel. The higher cost of instruments of stainless steel is more than offset by the fact that the instruments are practically indestructible, require less repairs and no replating; their length of service makes them an economical proposition. Ophthalmic knives are made only of the highest grade Hutsman's carbon steel; lithotrites and some guillotines of crucible carbon steel.

The catalogue includes everything that the general surgeon, the general medical practitioner, or the specialist could want information about. We would advise anyone who is setting up or equipping a hospital—whether general or special in type—to write for it. It will be of great interest to the medical profession throughout India generally.

The Indian agent is Mr. A. H. P. Jennings, Block F, Clive Buildings, Calcutta.

"MOTHERHOOD."

THIS is a small book of 151 pages, published by Cow and Gate, Ltd., Guildford, Surrey, England, at 1*s.*; and profusely illustrated with most charming photographs of healthy, happy infants and children. It is written in simple language, but with the co-operation of medical men, and deals in turn with pregnancy and the expectant mother; the baby's progress and feeding; minor ailments; the premature baby; and infant feeding in the tropics.

Cow and Gate milk food and other milk products are well known for their stability and purity, and are advocated for infant feeding in the tropics in Birch's "Management and Medical Treatment of Children." The book is one which will interest medical men and mothers throughout India, whilst its delightful photographs will make an appeal to every parent. We may add that Cow and Gate maintain a Motherhood Bureau in India, run by the Staff Nursing Sister, Sunnyside, Lytton Road, Quetta.

"ORALIN."

EVER since the discovery of insulin, attempts have been made to find out an efficient method for the oral administration of insulin in cases of diabetes, but the results were not satisfactory. Recent work, however, has apparently shown that the oral administration of the phosphotungstate of insulin definitely lowers the blood sugar of rabbits and also of diabetic patients. In this connection our readers may be interested in "Oralin"—which is stated to be the phosphotungstate of the active principle of the pancreas, prepared for oral administration in cases of diabetes, by the Bengal Immunity Co., 153, Dhurrumtollah Street, Calcutta. The firm will be glad to supply further particulars on application.

LONDON MEDICAL EXHIBITION.

NEW HORTICULTURAL HALL, LONDON, ENGLAND, OCTOBER 20–24, 1930.

Notes on Burroughs, Wellcome & Co.'s Exhibit.

AT the London Medical Exhibition, New Horticultural Hall, Westminster, held from October 20 to 24, Messrs. Burroughs, Wellcome & Co. displayed a number of interesting preparations, including "Diginutin," "Epinalin" and "Neo-Infundin."

"Diginutin" is a stable solution of the total glucosides of digitalis leaf, physiologically standardised; it is intended for oral administration. Biological tests show no loss of activity after 12 months. It is rapidly replacing tincture of digitalis, which is unstable and decomposes on dilution with water. It is interesting to note that much of the Digitalis purpurea used for this and other Burroughs, Wellcome & Co. digitalis preparations is cultivated on the "Wellcome" Materia Medica Farm, Dartford, England.

"Epinalin" combines the powerful but relatively transient action of adrenalin with the more prolonged effects of ephedrine. This was graphically illustrated by kymographs showing the effect of "Epinalin" contrasted with that of adrenalin.

Of interest, too, was the hand-painted illustration of *Ma Huang,* the plant from which ephedrine is isolated. Burroughs, Wellcome & Co. ephedrine preparations are made exclusively from the pure lævo-rotatory alkaloid containing none of the other ephedrine alkaloids, thus ensuring uniformity of physiological activity.

Other products of note shown were "Infundin" and "Neo-Infundin." "Neo-Infundin," the oxytocic principle of pituitary posterior lobe, has the same indications in labour as "Infundin," but the absence of the pressor principle precludes the occurrence of the vasomotor phenomenon known as "pituitary shock."

A feature of the exhibit was the series of large-scale photomicrographs of the causative organisms of certain diseases. Around the photomicrographs were grouped the products used in the prophylaxis and treatment of the disease concerned.

Charts demonstrated the growth-promoting powers of "Kepler" Malt Extract and "Kepler" Cod Liver Oil. "Kepler" products obviously provide an ideal means of supplementing the diet with vitamins A, B and D.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis,* if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette,* c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

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Original Articles.

RESULT OF THE FORECAST OF CHOLERA, SMALLPOX AND PLAGUE INCIDENCE IN INDIA IN 1930, AND NEW FORECAST FOR 1931.*

By SIR LEONARD ROGERS, M.D., F.R.C.P., F.R.S., MAJOR-GENERAL, I.M.S. (Retd.).

IN the *Indian Medical Gazette* of April 1930 I recorded forecasts of the probable variations from the average incidence of cholera, smallpox and plague respectively in different areas of India; these were based on the available meteorological data of 1929 up to November, the forecast was completed in January, and the principles on which they are based was explained briefly with references to former papers in which they were worked out. In the present communication I propose to indicate how far the 1930 forecast proved correct, and also to make a similar forecast for 1931, based on the 1930 weather date up to October so as to enable it to be published earlier than last year. I am indebted to the Director-General of Observatories in India for sending to me in London certain of the data as early as possible.

Results of the 1930 *forecast.*

In making my first forecast I pointed out that the well distributed character of the 1929 monsoon rains was unfavourable from my present point of view, so my forecast for 1930 would be largely of a negative character, but if correct it might still be useful to know that in most parts of India these three very important diseases were not likely to become epidemic during the current year. The following data based on the weekly returns, which are somewhat below the final figures will suffice to show that this has proved to be the case during 1930 up to October, which includes the seasons of their main prevalence.

Cholera incidence during 1930.

The annual seasonal increase of cholera occurs during November to March in south-east Madras, in October to June in Assam and Bengal, and from March to October in north-western and Central India and the Deccan, so data are available for testing my 1930 forecast. In this I anticipated a "moderate increase over the average" in the Surma Valley of Assam on account of the deficiency of the Silchar monsoon rains in July 1929, but although there was more cholera in the Surma than in the Assam Valley, it was below the average in both. I was thus wrong in this forecast, but I find I overlooked the great excess of rain in the earlier monsoon months with a total excess of 35.5 inches during the whole of 1929, such as is usually followed by low cholera.

In both eastern and western Bengal I anticipated about average incidence, and epidemic prevalence was absent with somewhat low rates, so the Bihar epidemic cannot have spread from Bengal. My general cholera forecast that "with the important exception of Bihar and the United Provinces no great departure from the average incidence of the last ten years is to be expected in the other areas dealt with" has proved to be remarkably correct. As I anticipated the Kumbh Fair at Allahabad in January and February 1930 was followed by a severe cholera epidemic in Bihar with over 30,000 deaths in May alone; apparently the worst epidemic in this area since the previous Allahabad Kumbh Fair of 1918.

In the east of the United Provinces I anticipated an excess due to the same cause, and I added: "this may be great if the winter rains fail, or if the February and March absolute humidity is in excess as in 1894." Fortunately the October to February rains were in slight excess, and, still more important, the absolute humidity in both March and April was exceptionally low and unfavourable to the spread of cholera, as in 1882, and also as in that year, although cholera broke out at the Allahabad Fair in February and began to spread, it was soon checked by the low absolute humidity, and cholera only became epidemic in the Gorakhpur and Fyzabad divisions during April to August, and to a less extent in the Benares and Allahabad divisions during the same months, and the outbreak as a whole was not nearly as severe as in the three previous Kumbh Fair years of 1894, 1906 and 1918, with favouring high absolute humidity in the first and previous deficient rainfall in the last two years, in accordance with the rules I have laid down from a close study of sixty years' records. In the west of the United Provinces I forecasted that the somewhat deficient 1929 monsoon rain of that area might be followed by excess of cholera subsequently to that in the east of the province, and the disease actually did increase in the Lucknow division in May to October and in the Rohilkund division in August to October, but the outbreak was not very severe in accordance with the moderate prevalence in the eastern divisions for the reasons already given. In the Punjab I forecasted a moderate increase over the average on account of the low rainfall in September 1929, which was followed by low winter rains, and accordingly the disease broke out in June and was still prevalent throughout September to a moderate extent, the usual season in this province in non-Hardwar Kumbh Fair years.

* Received by air mail, 26th December, 1930.

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The North-west Frontier Province also became infected, as anticipated, from late in May to the end of August.

In the Bombay Presidency I correctly anticipated low cholera in the Sind and the coastal Konkan areas, but moderate excess in the Bombay Deccan, with possible spread to Guzarat, and this actually occurred with a high rate in the Northern Deccan in July to September, and also an outbreak in Guzarat at the same time. In the Central Provinces I forecasted average to low incidence, unless cholera was spread into the eastern and northern divisions by the return of the pilgrims from the Allahabad Kumbh Fair, and into the western ones from the Bombay Deccan. Once more both these contingencies eventuated, with the highest rates in the Jubbulpore division, which is in the most direct communication with Allahabad, in April and May, and in the Chattisgarh and Berar divisions in May to October.

In the Madras Presidency I was again correct in forecasting low incidence in the north-west coastal area and excess in the Madras Deccan following low 1929 monsoon rains in the latter area, which had a rather severe outbreak in June to September, followed by a mild outbreak in the contiguous Bombay southern Deccan. In south-east Madras I also expected average to some excess following rather low rains from July to October 1929, and during November and December 1929 and January 1930 there were nearly 8,000 deaths in this area, but with over the average rainfall in January and February the outbreak subsided in February.

The above data will suffice to prove that my cholera forecast for 1930 was remarkably correct in nearly all parts of India, with the exception of the small Surma Valley outbreak, with regard to which I erred in my calculation. In fact the forecast turned out to be much more successful than I expected, following such a well-distributed monsoon as that of 1929, but further experience will be necessary to confirm the value of my methods. It is noteworthy that the increased cholera in the Bombay and Madras Deccan was forecasted some six months before it occurred.

Smallpox incidence during 1930.

It will be recalled that the smallpox forecasts are based on the fact that the disease declines to its annual minimum when the absolute humidity reaches its maximum during the rainy season. In consequence of this a failure of the monsoon rains in north-western and Central India, with relatively low average monthly monsoon absolute humidity, results in a smaller annual decline of the disease at that time of the year, with subsequent increased prevalence of the disease in the ensuing winter and hot weather months. In north-eastern India and in Madras low autumn absolute humidity is also liable to be followed by increased smallpox. Several consecutive years of low smallpox incidence also favour subsequent increased prevalence, and *vice versa*.

In my smallpox forecast for 1930 I pointed out that owing to the favourable monsoon rains of 1929 the data on which to base a forecast were unusually indefinite, and they pointed to the likelihood of few material departures from the average smallpox prevalence in India as a whole during 1930, and such proved to be the case. Thus in Assam and Bengal the rates were low as anticipated. In Bihar and Orissa I expected average prevalence to some excess owing to rather low autumn absolute humidity, but not markedly so on account of high prevalence in two of the three previous years; the incidence proved to be rather low. In the United Provinces I expected average incidence to slight excess, and it proved to be about the average. In the Punjab I anticipated average incidence and it has been low. In the North-west Frontier Province I forecasted a smallpox incidence above the average on the strength of low monsoon absolute humidity in 1929, but added that the increase was not likely to be material because the disease had been fairly prevalent in three out of the previous four years. The incidence actually proved to be very light, so here I was in error, apparently due to not having allowed sufficient weight to the fact that smallpox practically disappeared from this area during the 1929 monsoon.

In the Bombay Presidency I forecasted about an average prevalence, but here I failed completely to anticipate the epidemic prevalence of the disease in the Deccan districts which occurred from December 1929 to May 1930; the reasons for this error are now evident, for in the first place I failed to take into account the fact that the monsoon rains of 1929 did not reduce the high prevalence of the hot season of 1929 down to the average monsoon level, so that the usual autumn rise commenced from an unusually high minimal seasonal level, and the seasonal early cold weather rise was greatly favoured by most exceptionally low autumn absolute humidity in October and November, together with continued low readings from January to April 1930, and especially in February. As these data are unfortunately not published in the monthly weather records, even the autumn ones were not available to me at the time my forecast was made, or I should have taken them into account as favouring increased smallpox incidence, so here again the error was due to lack of data and not to any mistake in the principles on which my forecasts are made, and a few years further experience should help to make them more accurate in the near future.

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In the Central Provinces, however, my forecast of "above the average" smallpox incidence, based on low 1929 monsoon absolute humidity and low incidence of the disease in the two previous years, proved to be correct, and the eastern divisions adjacent to the Bombay Deccan suffered most. On the whole my smallpox forecast proved much less correct than the cholera one, although the Bombay Deccan outbreak was the only excess I failed to foresee for the reason just explained.

Plague incidence during 1930.

It may be recalled that plague incidence is favoured by previous low mean temperature during the hot weather and monsoon months and by low saturation deficiencies at all four seasons of the year, and *vice versa*, so forecasts are more complicated than in the case of cholera and smallpox. As plague is practically absent from Assam, Bengal and most of Madras, and in the Deccan the annual rise takes place during the monsoon months owing to the comparatively low mean temperatures in the rainy season, my forecast based on data up to November only dealt with northern India from Bihar to the North-west Frontier and the Central Provinces. In none of these areas were the 1929 climatic conditions particularly favourable to high plague incidence, so I forecasted that only moderate variations from the average incidence would be likely to occur in the direction of low incidence in Bihar and Orissa and in the Central Provinces, in both of which very low rates have been recorded in the weekly returns of 1930. In the United Provinces I also correctly anticipated about an average incidence. In the Punjab I expected "average to slight excess" on the strength of low saturation deficiency in the monsoon months, although the high mean hot weather temperature was against a high plague incidence. Plague proved to have a very low prevalence there during 1930, and the explanation appears to be that, for the first time I believe since the disease in the Punjab became widely prevalent in 1902, no cases were reported during the four monsoon months of June to September; an important prognostic fact I had failed to take into sufficient account. With this exception my plague forecast proved to be remarkably correct.

The general conclusion of my 1930 forecast was that there was no likelihood of any "great variations of cholera, smallpox and plague in India from the average incidence of the last decade, except the regularly recurring twelve-yearly Allahabad Kumbh Fair cholera one in Bihar and the United Provinces," and this has proved to be substantially correct especially as regards cholera and plague, so I venture to think that as a first attempt it is by no means discouraging.

Forecast of the Probable Variations of Cholera, Smallpox and Plague Incidence in India during 1931, *based on the Meteorology of* 1930.

The south-west monsoon rains of 1930, fortunately for India, were once more very regularly distributed and approximately normal in amount over the greater part of India, so they are again unfavourable from my point of view of enabling the incidence of epidemic diseases in India during 1931 to be forecasted. Nevertheless, I have made an attempt to do so in the following three tables, which do not require much comment, as my methods were described briefly in my forecast of 1930 with references to my earlier papers describing fully the researches which led me to think that approximately correct forecasts might possibly be made.

Table I gives the relative prevalence of *cholera* in different parts of India during 1928, 1929 and 1930, the last being based on the weekly records up to the middle of October; plus signs indicate over the average incidence and minus ones less than the average, while average ones are represented by a plus and a minus signs. The monsoon rain variations above or below the average figure in inches and the percentage of the whole during the months of June to October inclusive are next given, and my forecast follows, which a footnote explains will be liable to some modification in accordance with the winter rains and the absolute humidities at the season of the annual cholera increase in each area. No very serious epidemics are anticipated during 1931, or in the case of Assam, Bengal and South-east Madras during the cholera season of those areas from November 1930 onwards. This forecast has been completed in the middle of December at a time when only the October 1930 climatic data are available, in the hope of getting it published two months earlier than last year, so it will be interesting to see if it proves at all correct in spite of the two months' handicap in preparing it in London instead of in India, where I hope it will some day be made.

The *smallpox* data are shown in Table II and are based on the absolute humidities in the monsoon period from June or July to October, which I have found to be related to the subsequent smallpox incidence in the area as shown in the table of north-west and Central India, where previous low monsoon absolute humidities favour increased smallpox during the ensuing cold and hot weather seasons, and *vice versa*. In east India and Madras the autumn absolute humidities show the closest relationship to subsequent smallpox, and as these data are not yet available, I have not been able to include them in the table. As the data varied little from the normal in the monsoon period of 1930 they are very unfavourable for the purposes of a forecast, so no very severe smallpox epidemic is probable during 1931, but

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TABLE I.

Forecast of probable cholera incidence in India in 1931.

Area.	Previous prevalence.			Monsoon 1930.		Forecast.
	1928.	1929.	1930.	Inches.	Per cent.	
Assam Valley ..	—	— —	— —	—2	—2	Normal monsoon rains. Low cholera last two years. Some increase in 1930-31 season.
Surma Valley ..	—	— —	— —	—9	—7	Normal rains. Low recent cholera incidence. Moderate increase in 1930-31 season.
Bengal ..	—	—	—	—2	—4	Normal rains. Rather low recent cholera incidence. Moderate increase in 1930-31 season.
Orissa ..	—	—	— —	—7½	—14	Rains in moderate defect. Low recent cholera rates. Increased cholera in 1931.
Bihar ..	+ —	+	+ +	—9	—19	Rains deficient. Cholera epidemic in relation to Allahabad Kumbh Fair 1930. Cholera prevalent in 1931, but probably less than in 1930.
United Provinces	+	+	+	—2	—4	Normal rains. Cholera prevalent in last three years. Decreased prevalence probable in 1931.
Punjab ..	—	—	— —	—2	—10	Rains in slight excess. Low cholera last three years. Moderate prevalence probable.
N.-W. F. P. ..	— —	— —	—	—1	—20	Rains in moderate defect. Low cholera incidence for three years. Some increase if Punjab is infected.
Gujarat ..	—	—	—	—2½	—11	Rains in slight defect. Low recent cholera prevalence. Some increase likely in 1931.
Sind ..	+ —	+ +	— —	—3	—60	Rains in excess. Cholera epidemic in 1929 after short rains. Low incidence likely in 1931.
Bombay Konkan	—	— —	— —	—1½	—1	Normal rains. Low recent cholera incidence. About average incidence probable in 1931.
Bombay Deccan	—	— —	+ —	—	—0	Rains normal. Recent cholera incidence average too low. About average incidence likely in 1931.
Madras Deccan	+ +	— —	+	—4½	—22	Monsoon rains slight excess. Cholera high 1928 and 1930. Decreased cholera probable in 1931.
S. E. Madras ..	+ —	+ —	— —	—6	—37	S.-W. Monsoon and Feb.-March rain in excess. Low cholera 1930. Average incidence unless N.-E. Monsoon rains are low.
N.-E. Madras ..	+ +	— —	— —	—4½	—16	Rains moderate excess. Low cholera 1929 and 1930. Average incidence unless infected from Orissa.
Central Provinces	—	—	+	—3½	—9	Rains slight defect. About average recent cholera. About average prevalence in 1931.

Note.—Low winter rains or unusually high absolute humidity at the time of the annual increase of cholera in any area will tend to increase the incidence of the disease, and *vice versa*, so these data should be watched and taken into account by sanitary officers in modification of the above forecasts. + — indicates about average incidence, + moderate and + + considerable excess. — indicates moderately low and — — very low incidence.

TABLE II.

Forecast of probable smallpox incidence in India during 1931.

Area.	Recent incidence.	Monsoon absolute humidity.	Forecast.
Punjab ..	High 1927 & 28. Low 1929 & 30.	About average	Moderate smallpox prevalence, but above that of 1930.
N.-W. F. P. ..	Average 1928 & 29. Low 1929 & 30.	Rather low	Moderate prevalence, but above that of 1930.
Central Provinces	Low 1928 & 29. High in 1930.	About average	Moderate to low prevalence, and below that of 1930.
Bombay Deccan	Average 1928. High 1929 & 30.	Average in north; low in south.	Lower prevalence in North Deccan, but higher in the South Deccan.

I have still ventured to indicate the directions in which I anticipate the incidence will vary as compared with the normal or with that of 1930.

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TABLE III.

Forecast of the probable plague incidence in India in 1931.

Area.	Temperatures.			Saturation deficiencies.		Forecast.
	Hot season.	S.-W. Monsoon.	First quarter.	Hot season.	S.-W. Monsoon.	
Bihar and Orissa	+	+	+ —	+ +	+ +	High saturation deficiencies and temperatures indicating low plague incidence in 1931.
United Provinces	+	+ —	+	+ +	+ —	High hot season saturation deficiency; rather low plague incidence in 1931.
Punjab ..	+ —	—	+ —	— —	— —	Very low saturation deficiency in hot season; increased plague incidence likely.
Central Provinces	—	+ —	+	+ —	+	Climatic conditions very slightly unfavourable to plague; about average incidence in 1931.
North Deccan ..	—	—	+	+	+ —	Climate normal; about average plague incidence.
South Deccan ..	+ —	+	+ +	+	+	Saturation deficiencies high and unfavourable to plague. Incidence in latter part of 1930 and first half of 1931 below the average.

The *plague* data are given in Table III on the same lines of those of last year. They include the variations from the normal of the hot weather and monsoon mean monthly temperatures and of the saturation deficiencies for the first two or three cold weather months of the year, the hot season and the rainy season respectively. As previously explained temperatures and saturation deficiencies over the normal, shown in the table by plus signs, favour low plague in the subsequent cold weather and the early hot season of plague prevalence, and *vice versa*. The data for this year's forecast are not for the most part very definite, but as far as they go they point to low plague incidence in Bihar, the United Provinces and the South Deccan, about average figures for the Central Provinces and the North Deccan, and some excess over recent prevalence in the Punjab, but the latter is not likely to be very great in view of the exceptionally low Punjab plague incidence during the monsoon months of 1930.

ACTINOMYCOTIC LESIONS OF THE SKIN OF THE HANDS AND FEET, DUE TO *ACTINOMYCES KERATOLYTICA*, N. SP.

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(Under the Indian Research Fund Association.)

SOME time ago a Calcutta daily newspaper had an editorial on sore backs and cracked heels. The purport of the article was to point out that practically the whole of the rice grown in Bengal for the *aman* or winter crops was all transplanted grain. During the monsoon in July and August, when the fields were flooded, the ryot worked incessantly from early morning to late in the evening transplanting the rice plants from the nurseries to cover fields of over 10 million acres in Bengal. Day after day for weeks on end the ryot is standing in water and saturated by the monsoon rain so that he develops these lesions known as cracked heel and sore back. The suggestion implied in the editorial was that both these diseases were widespread, and yet in spite of this fact, the medical profession had not seriously considered them or suggested a remedy. For some considerable time before the publication of this editorial we had been working at the subject of cracked heels. The criticism levelled in that article could easily be made against the profession about many other more important diseases. The solution of a problem takes time, men and money, for one does not discover the cause of disease by fortunate accidents. At first trials are made, followed by failures, so that by a process of elimination the possibilities become narrow and narrower.

A new method of technique placed us in a position of advantage over our predecessors, who although extremely able men had failed to discover the cause. We may briefly outline what actually occurs during this disease, as material for investigation was only available on and off during the last three years. The lesions are most commonly seen during the monsoon months, i.e., between August and September, and amongst people actually working in the fields, but rarely amongst those living in towns. The ryots rarely come for

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treatment, as they accept the disease as an inevitable sequence of having to walk about on damp soil, and know full well that the lesions will disappear during the coming cold weather. A sharp look out therefore was kept in the wards for any patients showing these lesions, and when found they were sent to the laboratory for further investigation. At first we used the crude method of using a 40 per cent. caustic potash in the cold, which destroyed the fine mycelium before the scales were sufficiently cleared to see the fungus. At the same time we employed the usual methods of cultivation, agar, blood agar, Sabouraud's medium, and frequently grew a black Aspergillus which seemed to be the causative organism. As we could not see the mycelial elements in the lesion we hesitated to publish our results. The first real advance was made by the use of McGuire's stain; he saw the possibilities of modifying Ponder's method—a stain used for demonstrating the granules in the *B. diphtheriæ* —to stain these fungi. We were now able to demonstrate the organisms in the lesions in every case, but we were not able to cultivate the organism with any degree of certainty. This was the position we had arrived at when this editorial appeared in this daily paper. The next advance was made when an article appeared in the *Agricultural Journal of India* (Bangalore) published by Norris and his co-workers in July 1929 on a cultural method for enumerating the number of actinomyces in the soil. In October 1929 we sent a paper to the *Indian Medical Gazette* which was published in February 1930 on "Keratolysis plantare sulcatum, a lesion due to an actinomycotic fungus." Since that date with the help of Norris' medium we have been able to cultivate the organism in every case of the 42 different patients discovered in the hospital or out-patient department. We therefore tested different soils from the street, stables, cow sheds, etc., and found that the organism was not usually present in the street soil, but was present in horse and cow-dung and in manured soil. Finally we were able to reproduce the disease in man, and thus give the final proof of the pathogenicity of this organism.

In a private communication from Professor Kayser of Leiden he stated that he had also found the same fungus in Java, but looked upon it as a saprophyte from the soil.

Synonyms.—In Bengali, the lesion known as keratolysis plantare sulcatum (Acton and McGuire) and keratodermia plantare sulcatum (Castellani) is spoken of as *chaluni*, literally meaning a sieve, owing to the pitted condition of the thick skin of the feet. The word *haja* meaning sodden is applied to the sodden condition of the skin between the toes, which often splits giving rise to the deep type of mango toe. The cracked and fissured condition of the heel is spoken of as *phata*, meaning split. In Urdu the word *panki* is used, signifying that the lesion was caused by mud, *pank*.

The term keratolysis plantare sulcatum means that the thick horny skin of the soles of the feet is dissolved in grooves. The term mango toe is used to denote the thick sodden skin that develops between the toes, and this may be due to ringworm or actinomyces, the latter lesion giving rise to deep fissures between the toes. As the lesions are more commonly seen during the mango season (monsoon) hence the name. The cracked or split heel may be due to two main causes, in the monsoon usually it is due to this actinomycotic fungus, and during the cold weather to hyperkeratosis and its various causes. In 1907 Castellani described a lesion which he called *ulcus interdigitale* and this was confirmed by Breinl (1915) and Martinez and Lopez (1918). The lesion commences with itching between the toes, in a few days' time a deep fissure forms, which gradually enlarges into a large oval-shaped ulcer. The margins consist of heaped up sodden epithelium and the base is a dull dark red colour, there is little or no discharge and these ulcers are very painful. The ulcers may also appear on the soles of the feet near the tread of the great toe and the heel. We have found the same fungus in these cases.

Definition.—In India there is a red actinomyces that produces keratolytic changes in the skin of the hands and feet, causing the lesions known as keratolysis plantare sulcatum, mango toe, cracked heel, paronychia, onychomycosis and vesicular eruptions.

Ætiology.—The popular idea is that the lesions are caused by walking about continuously barefooted on damp soil, particularly soil contaminated by horse manure. Our results on soil examination tend to show that the popular belief is true as we have recovered the organism from both horse and cow manure. The lesions are usually seen in adults and we have not seen them in children. The ryot and maid-servants who are continually walking about on damp soil with bare feet are very prone to the disease on the feet. On the other hand *malis* or gardeners very frequently develop the lesions in or about the nail bed. The lesions are most frequently seen during the monsoon months, i.e., during August, September and October. We have seen the disease twice in Europeans, both were first officers on coastal vessels plying between the different ports of India, these officers usually walk about in the morning with bare feet supervising the washing of the decks.

Clinical types.—In 1930 Acton and McGuire described the lesion known in Bengal as *chaluni* or pitted feet in detail and suggested that this fungus may give rise to other clinical lesions. Since then we have been able to prove that there are four other types of lesions that can be caused by this fungus which are shown in Plate I, figs. 1–4.

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PLATE I.

Fig. 1.—Showing keratolysis of the skin of the palms; extension is occurring from infection of the finger skin between the fingers and the wrist.

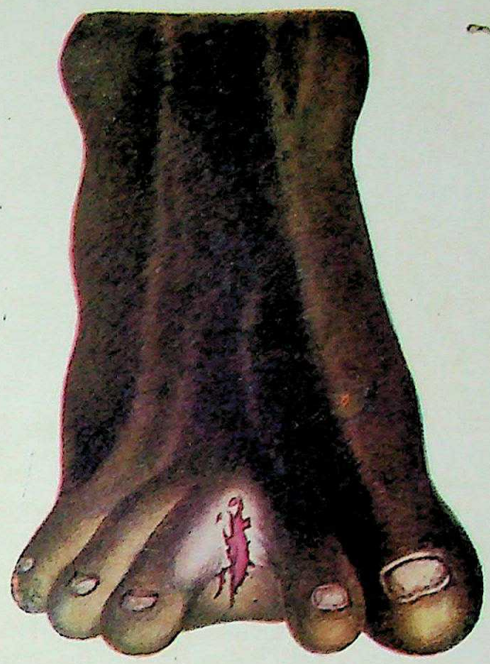

Fig. 2.—The deep fissured type of mango toe due to this fungus; notice the sodden condition of the skin between the toes known in Bengal as *Haja*.

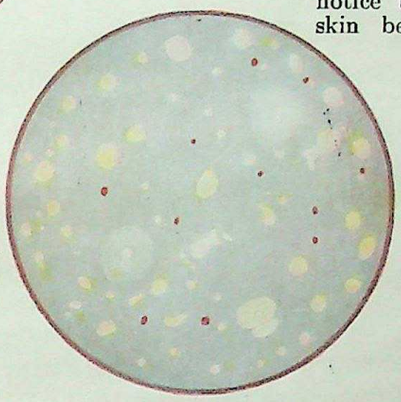

Fig. 5.—A plate culture of the scales on Norris' media; note the small red actinomycotic colonies which have to be dug out of the media for subculture.

Fig. 3.—Infection of the nails which frequently occurs at the base; often it is preceded by paronychia as seen in the third finger. The edge is thickened and raised from the nail.

Fig. 4.—The keratolytic and cracked condition known as *Phata* or split heel in Bengal.

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The commonest is the deep type of fissured mango toe depicted in Plate I, fig. 2. The epidermis on the sides of both toes at the interdigital cleft is thickened, white and sodden in appearance, usually on separating the toes a deep fissure extends through the corium into the subcutaneous tissues, is extremely painful and is likely to be infected by streptococci. At other times the infection takes place as an intertrigo between the web of the fingers or toes and extends on to the thick palmar or plantar surface as a gyrate area of keratolysis (*see* Plate I, fig. 1). More rarely the fungus produces a paronychia about the nails of the hand (*see* Plate I, fig. 3), so that the skin margin is thickened and lifted off the nail and an orange stick can be passed under it; sometimes the base of the nail is involved showing the characteristic brittle, moth-eaten appearance shown in Plate I, fig. 3. Recently Dr. Ganapati Panja has shown in four cases that an eczematous lesion commencing on the inner side of the instep on the fine skin of this region and extending on to the soles with the production of vesicles was due to this fungus (*see* Plate II, fig. 5). Hitherto we had regarded this lesion as a manifestation of *Tinea cruris* infection on the feet. The lesion known as ulcus interdigitale (Castellani) is also fairly commonly seen amongst persons who are continually walking about on damp soil, and have a good deal of friction to their feet, such as cooks, etc. The ulcers are seen about the interdigital cleft (*see* Plate III, fig. 1). Sometimes they are seen on the great toe and heel (Plate III, fig. 2). Sometimes these ulcers extend very deeply into the interdigital cleft (Plate III, fig. 3) and may even cause amputation of the toe by the secondary sepsis involving the joint (*see* Plate III, fig. 4). At first sight sometimes these ulcers and amputations look like trophic lesions, and the cases are mistaken for leprosy. The painful character of these ulcers and fissures readily distinguishes them from the anæsthetic trophic lesions of leprosy. There is also no involvement of the nerves, anæsthesia, etc.

Breinl (1915) described the extreme form of ulcus interdigitale as a separate lesion under the name of ulcus interdigitale destruens. The lesion starts as a small fissure which gradually forms a painful ulcer and then spreads fairly rapidly up towards the toe and down to the sole of the foot. The ulcer is deep and has irregular edges, and the granulation tissue is covered by an irregular dirty grey scab. The floor of the ulcer is reddish and uneven, and discharges a good deal of thick yellow pus. The ulceration may spread upwards between the toes and may gradually lead to complete loss of the affected toe, as is seen in Plate III, fig. 4. When healing occurs without amputation the adjoining surfaces of the toes may grow together. The ulcers are very chronic and may cause considerable deformity of the foot, when the toes are amputated and others grow together on the adjoining surfaces. There is no need to classify these ulcers by a special name, as they are only extreme cases of this interdigital ulceration that occurs in the condition known as *haja* or mango toe.

We are now employing greater care in diagnosing these lesions, which were originally regarded clinically as due to ringworm, by staining and cultural methods, so that frequently we are finding that many of these lesions on the feet are due to this actinomycotic fungus. The staining method of McGuire's is particularly useful in arriving at a correct diagnosis of intertrigo, as we see the different organisms which are present in these lesions, monilia, endomyces, ringworms, actinomyces, etc., and one can then make up one's mind as to whether the ringworm or actinomyces are of greater importance than the endomyces or monilia. Cultural methods that were first used were of little help as the endomyces and monilia soon overrun the surface of Sabouraud's medium and prevent the slower growing fungi from being seen in the media.

Mycology.—The tissue for examination is taken from the side of the pits or sulci in keratolysis plantare sulcatum, the edge of the keratolytic lesions on the palms and soles, or the tops of the vesicles. The tissue is placed on a slide and a few drops of the following stain poured on, i.e., toludine blue grm. 1, acetic acid 2 c.c., alcohol 4 c.c., distilled water to 100 c.c. As the tissue is often too thick and too deeply stained in 30 seconds for examination, the stain is mopped up with blotting paper and a few drops of glycerine placed on the slide to clear the tissue. A cover glass is placed on the top, pressure applied to flatten out the epidermis, and the specimen examined with a No. 10 ocular and a 1/12th oil-immersion objective. The mycelium is seen to consist of very fine branching hyphæ, segmented or non-segmented. The oldest hyphæ are very finely segmented and on superficial examination appear like a chain of fine streptococci. The appearance of the mycelium has already been shown in Plate I, fig. 2 of our previous paper, *Indian Medical Gazette,* No. 2, February, 1930.

Out of 42 cases consecutively examined by this method of staining we were able to confirm our clinical diagnosis in every case by finding the typical mycelium.

Culturally the best method for isolating these fungi is that described by Norris and his coworkers, 1929. The medium which they advocate has the following formula:—

Soluble starch	2 grms.
Dipotassium phosphate	0.5 grm.
Hydrated magnesium sulphate ..	0.2 grm.
Calcium chloride	0.05 grm.
Ferric chloride	0.01 grm.
Sodium nitrate	0.05 grm.
Asparagin	0.05 grm.
Agar	20 grms.
Water to	1000 c.c.

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The medium is made up to pH of 7.4. The cultures are incubated at 25° to 35°C. or room temperature for a fortnight. The feet should first be well scrubbed with soap and water and a nail brush to get rid of all the dirt and then the surface of the foot swabbed over with 75 per cent. alcohol. The tissue is selected from the sites mentioned above, i.e., the side walls of the sulci, the edges of the keratolytic lesions and the tops of the vesicles, and left in normal saline for 2 hours until quite soft. It is there teased between two needles into smaller bits and then placed in absolute alcohol for 1 minute. The small pieces of tissue are planted direct on this medium without washing as the alcohol dries and the bits of epidermis are planted here and there over the plate. In four days' time small pink raised colonies are seen, gradually becoming deeper in colour (*see* Plate I, fig. 5), still later they become flat, dark in colour, and have a moist appearance. This synthetic medium inhibits the growth of most organisms like cocci, etc., commonly found on the skin. If the primary culture is not quite pure, sub-cultures are again made on the same medium by rubbing on the contaminated colony after washing in saline on plate cultures. By this medium and plate cultures we were able to obtain successful cultures in all of the last 42 cases of this disease seen. The organisms grow best at room temperature, and aerobically; with partial anaerobiasis the growth is scanty, and with complete anaerobiasis there was no growth on the medium after a month. The cultural appearances on Sabouraud's test media, whey agar, serum, peptone water and blood agar have already been described in our previous paper of 1930. The following sugar media were tested: dextrose, lactose, sucrose, maltose, glycerol, but no acid or gas was produced in any of these sugars, there was a profuse growth on dextrose and glycerol. Litmus milk was turned slightly acid with the appearance of a pink ring at the surface, it was slightly clotted and the medium had a musty odour.

Morphology.—The fungus is best studied as regards its morphological characters by cultures on ordinary test tubes by growing on Sabouraud's medium, whey agar, etc. The mycelium will be found to consist of three types of hyphæ; aerial hyphæ can be studied by carefully scraping off the top of the colony and staining by McGuire's method; the surface runners and root hyphæ by breaking the glass tube and making free hand sections through the root area with a sharp Gillette razor blade. The thin sections of agar are allowed to dry for 24 hours, then stained by weak carbol fuchsin 1—20 and again dried for 24 hours and mounted in Canada balsam. The hyphæ are very fine, about 0.8 μ in diameter, usually segmented in all the different hyphæ.

In the stained preparation made by taking a bit of the surface growth two weeks old, the end organs are best seen. The end organs are of two kinds (*see* Plate II, fig. 1). (*a*) Terminal fuseaux or spindles; these occur at the end of the hyphæ, are slightly curved and consist of 2—3 segments, they are probably of the nature of chlamydospores. (*b*) Intercalary chlamydospores which form spore-like bodies along the hyphæ. (*c*) Conidia are rounded spore-like bodies 1 to 1.5 μ in diameter, they may be seen singly or grouped (*grappes*) occurring at the end or along the course of the hyphæ, in old cultures they surround the aerial hyphæ. As far as one can see they are not of the nature of aleuriospores but true conidia.

This fungus therefore is a very highly specialised plant, consisting of deep penetrating roots extending into the solid media often to a depth of half an inch or more. The surface runners are arranged radially and spread centripetrally on the surface, giving rise to the limpet-shaped colony. Projecting into the air are the aerial hyphæ carrying fusiform chlamydospores at the end, or single and grouped conidia along the course of these hyphæ. The centripetal spread is important in determining the shape of the pits and the gyrate lesions produced by this fungus, whilst occasionally the deep root hyphæ are able to penetrate as far as the prickle cell layer, open up the lymphatic spaces in this region, and give rise to vesicles. The fungus appears to have a marked lytic action on the horny layer of the epidermis of the soles of the feet and sometimes on the palms of the hand.

Bergey (1930) defines the genus *Actinomyces* as organisms growing in the form of a much branched mycelium, which may break up into segments that function as conidia; sometimes parasitic, with clubbed ends on radiating threads conspicuous in lesions in the animal body. Some are macro-aerophile or anaerobic, non-motile. These fungi belong to a much higher order than the EUBACTERIALES, so that morphological characters are more important in classification than cultural characters. In cultures, the colonies are seen as limpet shaped, red or black in colour, with deep roots penetrating the media, exactly similar in appearance to a fungus we have isolated several times from cases of Madura foot. On microscopical examination of the cultures the hyphæ are fine, about 0.8 μ in diameter, about the same thickness as *Actinomyces bovis*, but much coarser than the *Actinomyces asteriodes*. In the tissues, the hyphæ break up into small segments, and appear like a chain of streptococci. There are no club-shaped ends formed in the tissues, as in *Actinomyces bovis*. The conidia are small round-shaped bodies formed along the course of the aerial hyphæ, at the ends or growing out laterally. At first they are single but in old cultures they are grouped and surround the aerial hyphæ like the head of a stork.

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PLATE II.

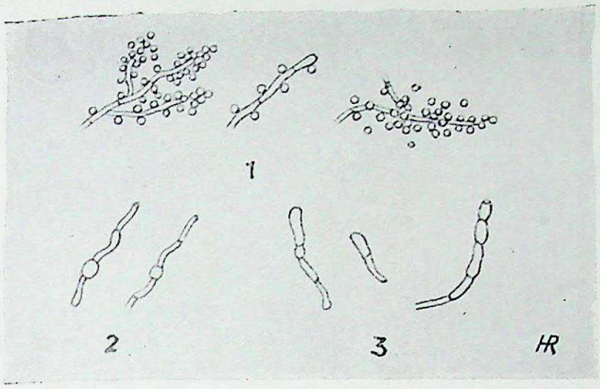

Fig. 1.—Drawings made under the 1/12th objective showing the various end organs of the fungus. (1) Single and grouped conidia, (2) intercalary chlamydospores, and (3) end chlamydospores.

Fig. 2.—Keratolysis between the fingers with fissuring corresponding to mango toe on the foot.

Fig. 3.—Early stage showing the sodden condition of the epidermis between the fingers.

Fig. 4.—Keratolysis plantare sulcatum. Notice the pitting of thick horny skin on the sole of the foot.

Fig. 5.—An eczematous patch on the thinner skin of the arch of the foot due to this fungus with secondary streptococcal dermatitis and formation of vesicles at the edge.

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PLATE III.

Fig. 1.—Deep ulcers on the little toe and extending to the ball of the great toe from the interdigital clefts.

Fig. 2.—Deep ulcers on the great toe and in the interdigital cleft of the 4th and 5th toes resembling trophic ulcers.

Fig. 3.—Deep interdigital ulcer between the 4th and 5th toes.

Fig. 4.—The ulcers on each side of the 4th toe have amputated this toe.

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The *Actinomyces bovis* has the same type of conidia, as well as the *Actinomyces maduræ* of Vincent. The *Actinomyces asteriodes* has no conidia. The terminal chlamydospores are segmented and named by Sabouraud *fuseaux*, and are seen in this fungus as well as in the *Actinomyces bovis* but not in *Actinomyces maduræ* (Vincent). In this fungus which causes keratolysis of the skin of the hands and feet, there are also intercalary chlamydospores which are not seen in *Actinomyces bovis* and *Actinomyces maduræ*. The fungus is therefore a new species, because it has the following differentiating characters from those hitherto described. In the tissues, the mycelium is seen to consist of branching segmented or non-segmented hyphæ depending on the age of the hyphæ, the ends are not clubbed. In cultures the colony is limpet-shaped, red or black in colour, and the pigment diffuses into the media. The fungus consists of roots, surface runners, and aerial hyphæ; the latter carry the following end organs, round conidia 1 to 1.5 μ in size, occurring singly or grouped at the ends and sides of the aerial hyphæ.

Terminal chlamydospores, spindle-shaped and broken up into 2 or 3 segments and slightly curved, as well as thickenings along the hyphæ, intercalary chlamydospores. We therefore propose to name this fungus *Actinomyces keratolytica* (n. sp.) on account of its property of dissolving the thick horny layer of the palms of the hands and soles of the feet.

We have been able to find the fungus in every case of the disease, and also to grow it from every case on artificial media so as to free it from other organisms or from the tissue fluids. Finally, to carry out Kock's postulates we have to reproduce the condition in man or animals to prove that the organism is pathogenic.

We had to investigate first the possibility that it was not a widespread saprophyte of the soil. Different types of soil were cultured on Norris' medium and we could only find the organism in horse- and cow-dung and in manured garden soil, but not in ordinary street or room scrapings. During the microscopical examination and insemination of the tissues on culture media, the soles of the feet were thoroughly washed, and in hospital cases a protective bandage was applied for a couple of days before taking the culture. The skin was then carefully swabbed over with 75 per cent. alcohol to obviate the possibility of growing saprophytic organisms from the surface. Moreover the organisms were seen invading deep into the horny layer. We also examined the fæces of 100 patients in the hospital and we were not able to recover the organism from them. In cases of chronic diarrhœa, in whom the fæces contained Charcot-Leyden crystals, but no *Entamœba histolytica* or non-lactose fermentors of the dysentery group, we were able to isolate this fungus. These cases responded to iodides by the mouth, and will be dealt with in a separate paper. Cultures were inoculated into guinea-pigs and monkeys superficially, intradermally, subcutaneously and intraperitoneally with negative results. On a human volunteer the skin was scraped between the 3rd and 4th toes on the under surface of both feet during the month of August and on the right foot the culture was smeared over the raw surface. In September a definite keratolytica area appeared on this foot but not on the other, by the end of September the lesion had spread as far as the sole. Microscopical examination and a culture made from this area showed that the fungus was present deep in the epidermis and was isolated in pure culture on Norris' medium. The lesion then cleared up with formalin lotion.

Differential diagnosis is extremely difficult if we have to rely only on clinical means, as the differences in the lesions are usually too subtle for anyone who has not had considerable clinical experience to differentiate them from ringworm. Even under these conditions an erroneous diagnosis would be made if we had only to rely on the naked eye diagnosis. The use of McGuire's modification of Ponder's stain is simple and does not require anything more than a microscope, slides, cover slips, the stain and some glycerine. Lesions due to hyperkeratosis such as tylosis of the hands and feet, those due to syphilis and yaws known under the title of keratodermia punctata and acrodermatitis perstans, can be readily recognised by the numerous large well staining vesicular nuclei in the scales. The ringworm fungus can easily be differentiated from this type of actinomyces, the mycelium is much thicker and can be readily seen by the 1/6th objective. In the older lesions of actinomyces numerous coccal forms are seen resembling staphylococci and one may have to examine several pieces of tissue before the fine branching mycelium is seen characteristic of this fungus. Clinically the condition known as *chaluni* or pitted soles is usually very easy to diagnose, but the same lesions on the hand are rare and may be possibly mistaken for the lesion known as keratodermia cribrata or punctata, a manifestation of syphilis, when pit-like depressions are formed on the palms by removal of solid horny balls from the surface epithelium. The paronychia attacking the skin round the margin of the nail, non-ulcerative thickening, and raising of the margin off the surface of the nail is very characteristic of this disease. Again the fungus attacking the base of the nail is more characteristic of lesions produced by this fungus than ringworm which usually attacks the free margin of the nail from the nail bed. The deep-fissured type of mango toe is more characteristic of actinomyces than of ringworm. On the other hand ringworm extending to the soles of the feet from the web of the toes or

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the fine skin at the instep produces more of an exfoliative type of lesion with large blebs of pustules simulating dermatitis repens and causing foot tethers (Cantlie), whilst the actinomycotic lesions generally show more keratolysis and the production of smaller vesicles and pustules. Anyhow one can confirm one's clinical diagnosis by actually seeing the causative fungus, and if this be not seen one must search still further until a cause is found for the production of the lesion. The cultural confirmation of the lesion is a refinement necessary for the research worker who is attempting to classify the causative agents present in these different lesions, which clinically simulate each other very closely.

Treatment.—The best treatment for the lesions of *chaluni*, pitted feet and paronychia round the nail beds is painting the area twice a day for three weeks with a lotion containing formaldehyde (commercial 33 per cent.) ʒi to the ounce of water, and for the nails we usually make up the lotion with glycerine. In cultures we found that a 1 : 400,000 solution of gentian violet was capable of inhibiting this fungus. We now use a 5 per cent. solution of this dye for the deep-fissured type of mango toe as the dye does not irritate the tissue. The pigment, consisting of resorcin ʒi and tinct. benzoin co. ℥i cures the thick sodden skin between the toes, when applied once a day for a week or so, but it is too dangerous to use it if the prickle cell layer is exposed or fissures are present between the toes.

Prevention would be simple if our patients could give up their occupation of walking barefooted on sodden soil, but this is impossible in Bengal for the ryot, servants, etc. The use of formalin lotion applied from time to time during the monsoon months at night would prevent the lesion spreading deep down into the tissues and crippling the patient, thus preventing him from doing his work in the rice fields.

Conclusions.

(1) The clinical lesions known as *phata* cracked heels, *chaluni* pitted soles, some types of deep mango toe *haja*, are all due to an actinomycotic fungus.

(2) More rarely it causes paronychia, onychiomycosis, keratolytic vesicular lesions of the hands and feet.

(3) The predisposing causes are constant contact with wet earth so that the epidermis of the hands and feet becomes sodden and loses its protective power through the horny layer.

(4) The fungus has been found in horse- and cow-dung, but not in human fæces except on rare occasions, and it is not usually present in the soil.

(5) The lesions are widespread in Bengal amongst the ryots, maid-servants, etc., who are obliged to walk barefooted on damp soil.

(6) The popular idea that it is due to walking barefooted on damp soil, particularly soil contaminated by horse manure, has experimental support from the laboratory.

(7) We have found the fungus in 42 cases microscopically, and by using Norris' medium have been able to isolate it in every one of these cases.

(8) We have been able to reproduce the lesion in man from our cultures.

(9) The fungus resembles in culture an organism we have isolated from Madura foot in several cases, but differs in many important morphological characters, i.e., the presence of fuseaux, single and grouped conidia, and intercalary chlamydospores.

(10) The fungus producing these lesions is a new species of Actinomyces for which we propose the species name *Actinomyces keratolytica* (n. sp.).

(11) Lesions are readily curable by a lotion of glycerine-formaldehyde ʒi to ℥i or 5 per cent. gentian violet applied twice a day for three weeks.

(12) The lesion known popularly as cracked or split heel, *phata*, seen during the monsoon months is due to this fungus; in the winter months it is due to hyperkeratosis and its various causes.

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A SIMPLE AND CHEAP APPARATUS FOR THE AFTER-TREATMENT OF CLUB FOOT.

By A. MARTIN-LEAKE, V.C., F.R.C.S. (Eng.),
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THE treatment of talipes equino-varus depends for its success on keeping up the position of over-correction until walking has been well established. Whatever treatment has been used to get the foot into the over-corrected position the deformity will recur unless the correction is well maintained. On account of the cost and difficulty in obtaining orthopædic appliances in this country the following apparatus was designed. It can be made by the local tin-smith and *mochi** and the cost is

* Leather-worker.

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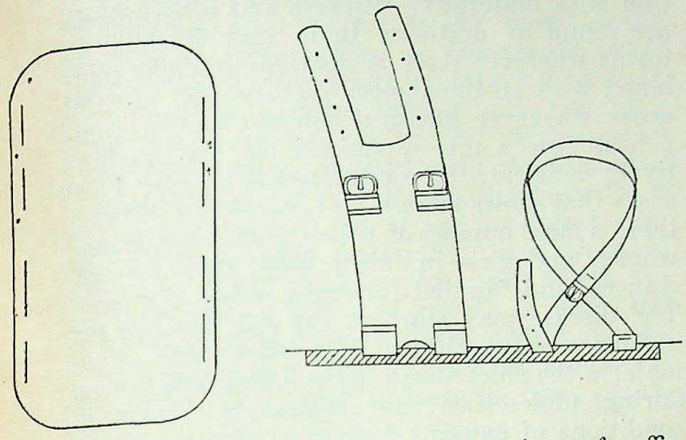
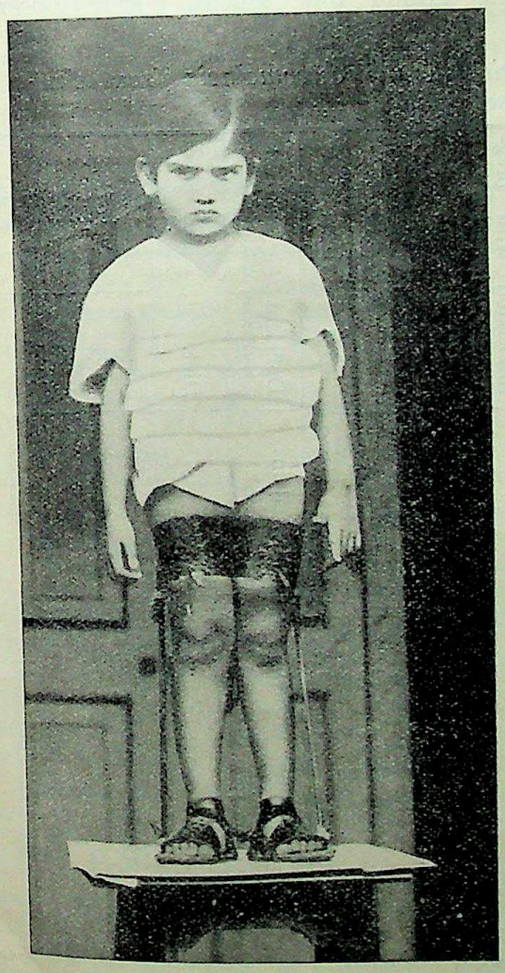
about Rs. 5. It has been in use now for 25 years and has been proved to be successful in maintaining the foot in good position after operation. The photographs and diagrams will almost explain the apparatus.

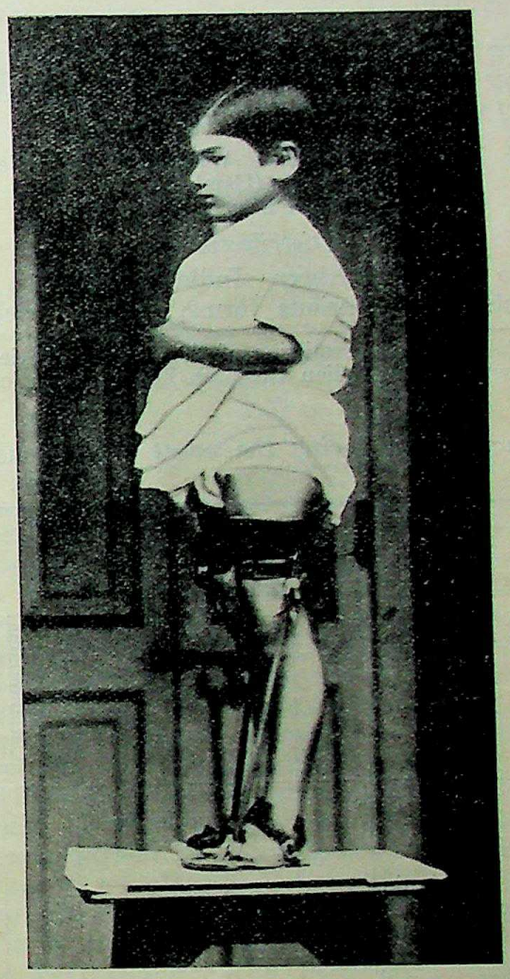


The foot-plate is made of aluminium of sufficient strength according to the size of the patient. It is made large enough for the slots for the straps, and the holes for fastening the rubber band, to be placed clear of the foot.



The slots are cut according to the diagram—a pair in front on each side for the broad anterior strap, and a pair behind on each side for the two ankle straps. Three holes are made in the anterior and outer aspect for the fastening and adjustment of the rubber band. A leather or felt sole is fastened with rivets to the under surface of the plate.

The straps are made of soft leather, fastened by stitching at one end, and by buckles at the other. The ankle straps are arranged in the figure of 8. The inner strap is the more important as it keeps the foot-piece up to its work when the elastic pull comes from the outer and front part. The thigh strap is about three inches in breadth and fastened by three



buckles; it has a ring attached on the outer aspect for fixing the upper end of the rubber band.

Ordinary rubber tubing is quite suitable to give the pull and can be fixed at each end with string.

The elastic adjustment is made after the foot-piece and thigh band have been placed in position. The necessary amount of tension and the most suitable point for it to act from can be found by trial. The three holes have been made in the foot-piece for this purpose.

The leather or felt sole is necessary to prevent concussion and slipping, and also to protect the ends of the leather straps which would

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otherwise quickly wear through. The apparatus when once fitted requires no special skill to keep in adjustment and any parent can learn to use it.

Renewals of straps, elastic, and soles are required from time to time. It should be kept on day and night and only removed for the bath. It can be made for any size of patient.

The high bands shown in the photograph are rather more elaborate and costly than those generally used, as the parents of the child were well off and wished to have a more finished article. It has been found that the simple leather band fastened by buckles works quite well.

THE DISTRIBUTION AND TREATMENT OF LATE RICKETS AND OSTEOMALACIA IN NORTHERN INDIA.*

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Women's Medical Service, India (Retd.).

Distribution.

No race in northern India is immune, but rickets in its various forms, infantile rickets, late rickets, osteomalacia are much more prevalent in certain castes owing to their mode of life. The disease is rare among men and boys except in conditions of extreme deficiency of diet or sunlight, but is chiefly met with among girls and women during adolescence and in connection with maternity. Rickets and osteomalacia are found in northern India and Kashmir in towns wherever there is deficient sunlight combined with an unbalanced dietary, and in rural areas whenever plentiful sunlight cannot compensate for a diet quantitatively and qualitatively deficient. The examination of over 1,500 cases that shows there is no caste or race distinction; a large number of urban cases occur among women and girls in fairly good social circumstances, and familial incidence is often present. The disease may start at any age, but the sex incidence shows that in late rickets and osteomalacia the chief strain falls on girls and women during adolescence and maternity, except in conditions of extreme deficiency when men and boys are also affected. The incidence of rickets was high in over-crowded and walled cities and in towns with narrow lanes and high sunless houses, as in Delhi and Gujranwala, or in densely populated bazaars, such as Simla, among Hindu and among *purdah*-observing

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TABLE I.

Factors influencing the onset in 400 cases of late rickets and osteomalacia from clinics at Lahore, Amritsar and Simla.

Race and sex.	Male.	Female.	Age before union of epiphysis = Late Rickets.		Onset over 17 years after epiphysical union = Osteomalacia.	Relation of onset to marriage.		Associated with pregnancy, lactation or abortion.	Associated with illness.	Deficient — sunlight (housing and *purdah*).	Diet.	Social condition of family.		
						Before.	After.					Poor.	Fair.	Good.
			Age in yrs.	No. of cases.										
Hindu (Brahmin, Rajput, Kayasth, Jain, Khatri, Bania, Arora, Chumar and Mehter).	5	204	5–10	33					Fever, 4 Pneumonia, 3 Cholera, 2 Intestinal infection, 2 Smallpox, 2 Disability after accident, 2 Measles, 1 Abdominal T.B., 1	A familial incidence was observed in 100 cases.		Coolies, menial workers.	Store-keepers, mechanics, clerks.	Merchants, lawyers, officials.
Mohammadan. [Sayed, Punjabi, Hindustani (U. P.), Kashmiri.]	1	150	10	18										
Sikh ..	..	29	11	14										
Indian Christian	..	11	12	25										
	6	394	13	29										
			14	34										
			15	32										
			16	41	174	148	252	218		240	160	209	174	17
				226										

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Mohammedan girls and women. Observations on the intensity of the ultra-violet solar radiation made by various observers using Hill's acetone methylene blue gauge in different Indian towns, give readings in "units" per day varying according to the season from 3 to 12. These readings are for exposure in the open, in the small dark room which is the poorer city-woman's home, the results of exposure are nil.

In Ludhiana a town with a very low incidence, where careful enquiry over two years by doctors and health visitors only revealed five indigenous cases of rickets and osteomalacia, it was found that the diet of the average household did not differ materially from that of women in a city such as Amritsar where the incidence for all forms of rickets is high, but in Ludhiana over-crowding was absent, houses stood separate and plentiful sunlight was available even for *purdah* women in open courtyards.

As the result of the examination of over 2,000 children of school age, rickets in towns was found to be associated with lack of sunlight either in over-crowded schools, or with diet also in certain industrial areas. Dental caries, a disease ætiologically closely allied to rickets, was found to be more widespread among Indian children than previously supposed.

TABLE II.

Incidence of rickets among school girls (ages 5 to 17 years) in Lahore.

Classification of schools.	Number of girls examined.	Number of cases of rickets.
I. Intra-mural congested city.	783	422
II. Extra-mural city ..	415	135
III. Well-planned suburban	284	50
TOTAL ..	1,482	607

Rural.—Occasional cases of rickets and of osteomalacia associated with pregnancy are met with among village women of the northern Indian plains. A high incidence of rickets and osteomalacia at all ages, in both sexes among Hindu field workers, is found closely associated with pressure on the available means of subsistence in the hill country of the Kangra district.

Doctors have reported osteomalacia among Pathan women of nomadic *Powindah* tribes of the North-West Frontier Province and among Mohammedan women in distant Kashmir villages. Investigation of the diet, housing and customs of such cases has shown that a consistent lack of vitamine D, either in connection with diet alone, or due to lack of sunlight,

TABLE III.

Age and sex distribution of rickets and osteomalacia among inhabitants of Launa village, Kangra district.

Caste.	Age under 17 years. Rickets.	Age over 17 years. Osteomalacia.	Total.
I. Chumars (men and women, field workers, cultivating other peoples' land). 109 persons examined.			
Male	22	18	40
Female ..	17	26	43
II. Zemindars (cultivating their own land). 47 persons examined.			
Male	8	..	8
Female ..	5	3	8
III. Gurkhas (families of military pensioners). 13 persons examined.			
Male	..	..	0
Female ..	..	..	0

was a predominant factor in ætiology, confirming the experimental findings in other parts of the world. Investigation of factors in treatment indicates the importance of food values, since a rapid improvement on the addition of vitamine D is only obtained if vitamines A and C are included in the diet, while excess cereal appears to exert an adverse influence. Climate is a secondary factor, but whenever the disease is present, the seasonal incidence of damp and cold augments the condition. Certain observations on the blood chemistry of these patients (1) show the varying content of serum calcium and inorganic phosphorus at different stages of the disease. The blood picture is similar to that of certain deficiency conditions, while the examination of stools and urine indicate the possibility of an infective process in the intestine either as a primary factor, or dependent on an avitaminotic condition; the study of adult spasmophilia in connection with late rickets and osteomalacia indicates that intestinal conditions may cause exacerbation. Infantile rickets (under 5 years of age) occurs fairly equally among boys and girls. It is rare for the children of osteomalacic mothers to show signs of rickets until the second year. The onset may be at any age (Table I), but many cases start in connection with reproduction (pregnancy, lactation and abortion), occasionally the disease is noted as having started after some illness. Menstruation is usually normal unless some other condition such as anæmia is also present.

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Clinical diagnosis.—The manifestations of late rickets and osteomalacia vary according to the physiological conditions in the bone at different ages. *Late rickets* occurs from about 6 to 17 years before union of epiphyses; radiological examination(2) shows the formation of irregular osteoid tissue in the region of the epiphysis. There is bossing, enlargement at wrists and ankles, knock-knee and also curving of the leg bones and irregularity of dentition. Coxa vara is not uncommon owing to slipping of the femoral epiphysis. Pain may be felt in the knee or other affected parts. *Osteomalacia* occurs after the union of epiphyses, after the eighteenth year, in bones which have achieved maturity, and *X*-rays show a rarifying osteitis. Early signs are (1) an uneven gait on a slightly wide base with a tendency to swing the leg outwards before putting the foot down. (2) The pelvis seen from behind may appear flattened, wider than normal and slightly tilted. (3) There is increased dimpling of the skin over the sacro-iliac articulations. (4) Subperiosteal tenderness is often present in the long bones, and may be elicited over the inner subcutaneous shaft of the tibia. Early cases of osteomalacia are often diagnosed as rheumatism and unsuccessfully treated with salicylate. *Later*, the characteristic waddling gait and irregularly contracted pelvis are present. There may be marked bending of the long bones and deformity of the spine and chest. Flexor spasms of adductor muscles increase the disablement. Muscular irritability noticeable as tetany, carpo-pedal spasm and twitching of facial muscles, is often associated with exacerbations of the disease due to pregnancy or lactation and ceases quite apart from treatment with subsidence of the acute condition. Cases with spasm may be diagnosed and treated as hysteria. During the present enquiry tetany among men and boys was noted in the Kangra district and the relationship shown of the so-called idiopathic tetany, *wai* in Kashmiri, and the endemic tetany in goitrous districts of the Himalayas mentioned by Castellani(3) to the various manifestations of rickets.

Pain.—The extent of pain is described as a severe or dull ache, and the degree of tenderness on pressure depends on the acuteness of the condition. Common sites are over the sacrum and lower lumbar vertibræ, in the bones of the pelvic girdle, and in long bones. Pain in the ribs often accompanies an acute exacerbation and usually is very amenable to treatment. Persistent pain in the back is probably due to strain of the lumbo-sacral articulation; such cases are not infrequently diagnosed as tuberculous, though other signs of osteomalacia are to be seen, and the occurrence of tuberculous bone disease in osteomalacic patients is very rare.

Prognosis.—Late rickets and osteomalacia apart from treatment are characterised by intermissions and exacerbations. Towards the end of reproductive life there is a varying degree of deformity but pain often is absent.

The outlook for treatment is satisfactory when social conditions are fairly good; the deficiency in diet and sunlight can be remedied and patients can afford to continue to live healthily and prevent the recurrence of the disease owing to a return to faulty conditions; it should also be possible to prevent the disease occurring in younger members of the same family. For the poor who cannot alter their deficient dietary the outlook is unfavourable, since even sunlight under these conditions is of little value.

Treatment.—The best results were obtained when the administration of some form of vitamine D (cod-liver oil containing that vitamin, or an irradiated substance for patients who dislike the use of animal oil), was combined with the daily use of milk, not less than 8 ounces, fresh fruit or greens, and sunlight (at least 2 hours out of doors), with as much direct exposure of the skin as practicable, and massage of the affected parts. Unfortunately such treatment is costly.

Observations were made on the value of the different factors in this "combined" treatment on 41 girls and women, cases of late rickets and osteomalacia of moderate or severe degree, and results controlled by repeated *X*-ray examination. Patients continued to live in their own homes but attended the clinic regularly for at least three weeks, and many were kept under observation for 2 to 5 months. They were divided into 5 groups and treated respectively by the addition of (1) diet (milk and fruit), (2) sun (two hours' exposure daily), (3) vitamine D alone, (4) diet and sun, (5) sun and vitamine D. Each factor added was partaken of under supervision. The results indicate the importance of food values and a balanced diet in treatment. Improvement in diet leads to but little improvement in symptoms if sunlight is deficient; conversely the provision of sunlight for cases on deficient diets is of no avail, a fact confirmed by observations made in the Kangra district. Cases on full doses of vitamine D improved gradually, but in order to get more rapid results it is advisable to combine the use of a moderate dose of vitamine D with daily exposure to sunlight and an improved diet, i.e., the addition of vitamines A and C; there is also much value in thus training patients in a better mode of life.

Experiments have been made with the use of Indian fish oils and also attempts made to get irradiated substances manufactured on a commercial scale in India, but so far unsuccessfully.

Massage or galvanic baths are useful in easing pain. Indirect ultra-violet radiation can, if necessary, be substituted for exposure to sunlight.

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Exacerbations of spasmophilia may be controlled by the oral use of magnesium sulphate.

Prevention.—Information regarding the prevention of osteomalacia and rickets has been spread in the Punjab through the agency of the Red Cross. Probably the most useful propaganda is through the younger generation; e.g., a very simple but amusing little drama in the vernacular on the prevention of rickets and osteomalacia (i.e., what to eat and the use of sunlight), has been successfully acted on various occasions by school-girls at Palampur. This little drama has been printed in Hindi by the Rural Community Board, Punjab, and has been sent by the Education Department to be read in all girls' schools in the Kangra district. A grant towards the cost of this enquiry was received from the Punjab Government.

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NOTES ON THE BLOOD FINDINGS AND RESULTS OF TREATMENT IN TWENTY CASES OF OSTEOMALACIA.*

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Maternal Mortality Inquiry, Indian Research Fund Association.

(*From the Haffkine Institute, Parel, Bombay.*)

THE observations recorded in this paper are the result of the combined work of the staff of the Carma and Albless Hospital, Bombay, and the members of the Maternity Mortality Inquiry, Indian Research Fund Association. The author who is responsible for the blood analyses has only brought together the result of the team's work.

The material studied included 18 cases in pregnant women, and two cases in non-pregnant women. With the exception of two Hindus, one a pregnant woman from the north of India, and one non-pregnant case, all the women were members of the Mohammedan community.

The diagnosis of osteomalacia was made on the history and clinical picture. The usual history given was a complaint of pain in the legs, pelvis and ribs, with difficulty in walking, generally dating from the first pregnancy, with remissions after each delivery and increasing severity in each succeeding pregnancy. In the non-pregnant cases the symptoms began some years after the women had started observing *purdah*. On examination the number of bones affected and the severity of the pain and disability on walking varied with the acuteness of the disease. In practically all cases there was the characteristic waddling gait and in old standing ones complete crippling and inability to walk. The pain on movement or on pressure over the bones might be very severe. Bony deformity was variable but there was practically always marked pelvic deformity with reduction of all the external measurements (*see* Table I); natural birth in many of the cases was impossible. The patients were all undersized and ill developed. One case had severe tetany, but there were no signs even of latent tetany in the other cases.

The observations recorded include notes on the clinical condition, the nature and effect of treatment, the result to mother and child in the pregnant cases that were followed through and records of the pathological examinations; the latter included estimations of serum calcium and inorganic phosphate in whole blood, complete blood counts, stool examination and the Kahn test. Unfortunately an *X*-ray examination of the bones could not be made.

The patients were treated with cod-liver oil by the mouth, and exposure to ultra-violet light, either separately or combined. It was found that with no treatment the cases improved if they were allowed on the verandahs, but that if kept in the inner ward away from direct sunlight there was no improvement, either clinically or in the blood findings. The light on the verandahs was therefore sufficient to start healing. The women disliked cod-liver oil and it was impossible to give it in the large doses recommended by Maxwell(1). The ultra-violet light treatment was given by exposing the patients three times a week to a Victor lamp: the distance from the lamp was in all cases 48 inches till treatment had been continued for some weeks, when in a few cases it was decreased. The dose of light was regulated by exposing increasing areas of the body

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for increasing periods of time till a maximum dose of 10 minutes' exposure for the whole body was reached. The patients liked this method of treatment which relieved the pain very quickly in most cases, partly apparently by decreasing muscle spasm.

Serum calcium was estimated by Clark and Collip's(2) modification of Kramer and Tisdall's(3) method. The serum was separated as soon after clotting as possible* and the greatest care was taken in the cleansing of glass-ware and in the prevention of contamination by dust. Duplicate estimations at increasing time intervals showed that precipitation was complete after half an hour.

A modified Bell and Doisy(4) method, as recommended by de Wesselow(5), was used for the estimation of the inorganic phosphate of whole blood. The question of transport made it impossible to separate the plasma immediately; whole blood was therefore used so that the estimations could be carried out without undue delay. As the values obtained did not vary directly with the red cell counts it is clear that the lowered figures were not due to the moderate anæmia that occurred in many of the cases.

The findings are given in Table I. The clinical syndrome was very constant, the variations being a matter of degree rather than of kind. The alterations in the level of the inorganic phosphate content of the blood and of the serum calcium were the most striking findings: these are summarized in Table II, and for purposes of comparison similar figures for two control series are given. In all the cases the inorganic phosphate figures were lowered, and in the majority this lowering was very marked and resembled, in order, that found in infantile rickets. The serum calcium values, with the exception of one from a case that was suffering from tetany at the time of examination, were moderately but significantly lowered as compared with the average figure in normal pregnant women. There was a moderate anæmia in some of the cases. Trichuris ova were present in the stool in two cases, and in one of these, those of Ascaris, were also found. The Kahn test was strongly positive in one case but became negative after appropriate treatment.

Table III shows the result of treatment in representative cases. Many of the women discharged themselves before there was time for any marked change in either the clinical condition or the blood findings, but all cases showed improvement with treatment. Owing to the difficulty in persuading the women to take large doses of cod-liver oil few were treated with this drug alone, but as cases 2 and 7 (Table III) show, the oil alone did cause an increase in both the calcium and phosphate content of the blood and would undoubtedly have cured if persisted with. The improvement in the clinical condition obtained under suitable treatment ran parallel with the return to normal of the values for the blood inorganic phosphate rather than those of the serum calcium, and, as case 15 (Table III) shows, a slow rise in the phosphate figure was associated with slow clinical improvement. After delivery there was always an improvement both in the clinical condition and in the chemical findings, whether there had been treatment or not, but as case III (Table III) shows the blood findings might become

TABLE II.

Serum calcium and inorganic phosphate values in Indian women of the hospital class in Bombay.

Class.	Number of cases.	Calcium. Mgs. per 100 c.c. Mean.	*	Range.	Inorganic phosphate. Mgs. per 100 c.c. Mean.	*	Range.
Normal pregnant women. Mean red cell count 4.0 million	11	10.1	0.34	9.6–10.6	3.38	0.54	2.60–4.30
Anæmic pregnant women. Mean red cell count 2.0 million	21	9.4	0.58	8.4–10.6	3.12 (23 cases)	0.55	2.18–4.20
Pregnant women with osteomalacia.† Mean red cell count 3.61 million	17	8.26	0.80	6.7– 9.7	1.67	0.52	0.96–2.67

* Standard deviation. † One case with tetany excluded.

* The blood should not be centrifuged to separate the serum, as more than the briefest centrifugalization causes an appreciable increase in the calcium content.

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[PART I.

Record of osteomalacia cases.

Case number.	Religion.	Parity.	Month of pregnancy.	Complaint.	Duration of symptoms in years.	Before treatment. Calcium mgm. per 100 c.c. serum.	Before treatment. Inorganic phosphates mgm. per 100 c.c. blood.	Red Blood Cells millions per c.mm.	Hæmoglobin %. 13.8 g. = 100 %.	Stool ova.	Kahn test.	Pelvic measurement in inches. Inter spiral.	Pelvic measurement in inches. Inter cristal.	Pelvic measurement in inches. Anterior, posterior.	Pelvic measurement in inches. Transverse outlet.	Duration of treatment in days.	Treatment.	After treatment. Calcium mgm. per 100 c.c. serum.	After treatment. Inorganic phosphate mgm. per 100 c.c. blood.	Result.	Method of delivery.	Result to child, and weight of child in lb.		Remarks. On shape of pelvis
1	* M.	1	9	Pain in lower extremities and ribs. Difficulty in walking.	0.5	8.2	0.96	5.28	65	Trichuris	..	8.5	9.5	6.5	3.25	38	Cod-liver oil and light.	9.5	2.73	Pain less, walking better.	Natural	† A	5.0	Promontory felt.
2	M.	2	8	Pain in back and lower extremities. Difficulty in walking.	8.0	9.2	1.19	3.28	58	Nil	..	8.0	8.5	6.5	1.75	82	Do.	9.7	3.70	No pain, walking better.	Cæsarean	A	5.5	Generally contracted pelvis.
3	M.	2	7	Do.	2.0	9.2	1.00	2.46	52	Nil	..	8.5	9.5	7.0	3.00	72	Light	10.4	4.31	Well. Walking much improved.	Natural	A	6.0	
4	M.	Not pregnant.		As above and pain in ribs.	0.25	9.7	1.25	2.98	55	Nil	..	8.0	8.75	6.0	2.75	12	Do.	10.8	1.48	No improvement	..	..	..	
5	M.	4	6	Do.	2.0	8.5	1.49	3.04	58	Nil	..	8.0	8.5	6.5	3.00	12	Cod-liver oil	9.3	1.82	Improved ..	..	..	..	
6	M.	6	6	Tetany—severe pain in hands and feet.	1.5	4.4	1.81	3.20	60	Nil	..	9.0	10.0	7.0	3.00	..	....	..	..	....	..	..	..	
7	M.	2	6	Pain in lower extremities, difficulty in walking.	1.5	7.7	1.30	3.51	62	Nil	..	7.75	8.5	6.5	2.50	32	Cod-liver oil and light.	9.3	2.43	Pain relieved ..	..	..	..	Triradiate small pelvis, outlet admits two fingers.
8	H.	1	Not pregnant.	Pain in ribs and extremities. Great difficulty in walking.	3.0	7.15	2.40	3.77	72	Ascaris and trichuris.	..	7.5	8.5	7.0	3.00	14	Light	9.0	2.48	Pain much less	..	..	..	
9	M.	2	9	Do.	5.0	8.3	1.15	3.24	60	Nil	—	8.25	9.5	7.0	2.0	27	Cod-liver oil and light.	9.2	3.52	No pain, walking better.	Cæsarean	A	6.5	Outlet contracted.
10	M.	2	7	Great pain in lower extremities. Difficulty in walking.	0.1	9.2	2.29	3.44	68	Nil	—	8.5	9.25	6.25	3.0	13	Do.	9.0	2.9	Pain less, walking better.	..	..	..	Promontory felt.
11	M.	3	6	Do.	1.0	7.9	2.38	3.10	58	Nil	+++	8.0	8.75	5.75	2.75	..	....	..	..	....	Natural	A	..	
12	M.	1	7	Great pain in bones, unable to walk or sit up.	1.0	8.2	1.98	..	..	Nil	—	8.0	9.0	6.0	2.75	6	Cod-liver oil and light.	8.15	2.08	Pain less ..	Do.	A	4.5	Promontory felt.
14	M.	1	Full term.	Pain in lower extremities. Great difficulty in walking.	1.0	9.0	2.67	4.88	82	Nil	—	7.5	8.25	6.0	3.00	10	Do.	10.2	3.20	Improved ..	Do.	A	6.5	
15	M.	5	6	Pain in extremities, ribs, back; unable to walk. Great difficulty in standing.	0.25	7.8	2.0	4.80	72	Nil	+	8.0	9.0	6.75	3.25	57	Do.	9.4	2.74	Pain slightly better, can walk few steps.	Do.	A	6.0	Promontory felt.
16	M.	3	8	Pain in hips and pelvis, difficulty in walking.	0.1	6.7	1.24	4.23	82	Nil	—	8.75	9.5	5.5	2.50	43	Do.	9.3	2.94	Improved. Walks better.	Cæsarean	D	6.25	Generally contracted pelvis.
17	M.	3	9	Pain chiefly in joints, also in spine and pelvis; difficulty in walking.	10.0	7.5	1.80	4.16	76	Nil	—	9.75	10.25	7.0	..	30	Do.	9.2	4.0	Pain relieved, walks better.	Natural	A	6.75	
18	M.	3	9	Pain in lower extremities and back, difficulty in walking.	6.0	9.7	1.58	..	..	Nil	—	7.75	8.5	6.5	1.75	21	Do.	9.4	2.26	Do.	Cæsarean	A	5.5	Triradiate pelvis.
19	M.	1	7	As above and pain in ribs.	0.5	7.9	1.34	..	..	Nil	—	8.5	9.0	6.25	3.00	7	Cod-liver oil	..	..	Improved ..	..	..	..	Sacrum incurved. Slight beaking.
20	M.	4	6	Do.	7.0	8.1	1.76	..	..	Nil	—	8.5	9.25	6.25	2.25	36	Cod-liver oil and light.	..	..	Do.	Cæsarean	A	5.0	Public arch very narrow. Sacrum very prominent.
21	H.	6	4	Pain in lower extremities and difficulty in walking.	10.0	7.0	2.42	..	..	Nil	—	..	..	..	..	..	....	..	..	....	..	..	..	

* M. = Mohammedan; H. = Hindu.

† A = Alive; D = Dead.

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TABLE III.

Representative cases to show progress under treatment.

Case number.	Day of observation.	Treatment.	Clinical symptoms and progress.	Calcium mgm. per 100 c.c. serum.	Inorganic phosphate mgm. per 100 c.c. blood.
2	1	No treatment but in verandah.	Pain in back and lower extremities. Difficulty in walking.	9.2	1.19
	7	Treatment started. Cod-liver oil ʒii bis.	.....	..	..
	8	.....	.....	9.6	1.38
	11	Cod-liver oil ʒii t.d.s.	.....	..	..
	18	.....	.....	8.9	1.87
	27	.....	.....	8.9	2.17
	34	Light treatment started, oil continued.	Pain and difficulty in walking.	8.3	2.23
	49	.....	Pain less	10.0	3.12
	56	.....	.....	9.8	3.26
	66	Cod-liver oil reduced to ʒfs. bis.	.....	9.9	3.29
	72	.....	Pain relieved. Walks easily. Delivered.	..	..
	79	.....	.....	9.6	3.31
	89	Light treatment stopped	Discharged well ..	9.7	3.70
3	1	No treatment but out in verandah.	Pain in lower extremities and difficulty in walking.	9.2	1.00
	8	Light treatment begun	.....	9.8	1.59
	18	.....	Pain less. Walks better	9.9	1.39
	28	.....	Œdema both legs ..	9.4	2.67
	35	.....	Light out of order for preceding week.	9.0	2.21
	41	.....	Œdema gone ..	9.8	3.12
	48	.....	Improved	10.1	2.86
	58	.....	.....	9.5	3.44
	68	.....	Patient well ..	9.4	3.65
	72	Treatment stopped ..	Delivered	..	..
	80	.....	Discharged well ..	10.4	4.31
7	1	No treatment, kept in ward.	Pain in lower extremities and difficulty in walking.	7.7	1.43
	8	Cod-liver oil ʒii t.d.s.	.....	7.7	1.30
	22	Light treatment begun. Oil continued.	Pain still present ..	..	2.27
	29	.....	.....	8.5	2.32
	40	.....	Pain relieved ..	9.3	2.43
15	1	No treatment but out in verandah.	Pain in extremities, ribs and back, very severe, unable to walk: severe headache.	7.8	2.0
	8	Treatment begun. Cod-liver oil ʒii t.d.s., and light treatment.	.....	8.8	2.3
	16	.....	.....	9.2	2.5
	23	.....	.....	9.5	2.6
	33	.....	Pain still very severe unable to move unaided.	9.8	2.74
	45	.....	.....	9.8	2.20
	49	Collip's parathyroid. 9 injections of 0.5 c.c.	Pain relieved ..	..	..
	51	.....	.....	9.8	2.26
	56	.....	Pain better ..	..	..
	57	Injections stopped. Earlier treatment recommenced.	.....	..	..
	65	.....	Pain worse again ..	9.4	2.74

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normal and the disease inactive before delivery when the treatment had been adequate.

The etiology of osteomalacia has been well worked out by Maxwell(6) and other workers, and it is now generally thought that it is a deficiency disease associated with an insufficiency of vitamine D in the body, in other words rickets in the adult. The frequent association with pregnancy is due to the extra demands made on the maternal organism by the growing fœtus for the bone forming elements, calcium and phosphorus. Our cases were typical clinically and the diagnosis was never in dispute. The blood findings, the markedly lowered inorganic phosphate values, and the moderately lowered calcium values are similar to those generally found in infantile rickets. The one case that had a markedly lowered serum calcium content was the only one of our cases with tetany (*cf.* low calcium rickets with tetany). Maxwell's cases in China had lower calcium values than our cases and therefore suffered far more frequently from tetany. The factor which determines the occurrence of tetany in one set of cases and not in another is at present uncertain, but it may be connected with the supply of salts in the diets. Hughes(7) reports interesting figures from the Punjab where he finds high serum calcium values in normal people, and in his osteomalacia cases ones which are relatively lowered though still within the generally accepted normal range. These results await confirmation.

The response to treatment was the same in our cases as in cases of active rickets. The diet, which could not have been absolutely deficient in either calcium or phosphorus, was not altered, but the supply of vitamine D was increased either by the exhibition of cod-liver oil or by exposing the body to ultra-violet light. As a result of this treatment the blood chemistry returned to normal and the disease became inactive, though alas, bony deformity remained.

The incidence of the disease in Bombay is most instructive and demonstrates once again the importance of light in a population whose diet is deficient in animal fat. The disease in the city is practically limited to the Mohammedan community, especially the Bohara section, the reason being that the Mohammedan community is the only one whose women keep *purdah*. Prevention lies in their hands. Their diet is on the whole richer in fat and more varied than that of Hindus in the city, but partly because of the poor quality and adulteration of the *ghi* and milk and partly because of the insufficient quantity of these consumed it is not rich enough in vitamine D to prevent the onset of osteomalacia. But in Bombay such a diet need not produce this crippling disease, for sunlight, a sure preventive and cure, is always to be had and affords complete protection to those communities and individuals who expose themselves to its beneficial influence. It remains for the enlightened members of the Mohammedan community to see that their women do not suffer from this most cruel, because most easily preventible, of diseases.

My thanks are due to the Governing Body of the Indian Research Fund Association who provided funds for this Inquiry.

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RESULTS OF BLOOD EXAMINATIONS IN SPRUE.

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WHILE investigating the subject of "tropical anæmias with special reference to pernicious anæmia" at the Carmichael Hospital for Tropical Diseases, Calcutta, it has been found that there is a striking resemblance between the blood picture in cases of advanced sprue and the blood picture of Addisonian anæmia. A close and thorough study has been made of 27 cases of sprue from the clinical, laboratory, and therapeutic standpoints; and I propose to restrict my observations only to the blood examination of these cases in this paper.

I am able to make a distinction between sprue and the pre-sprue stage of the disease by the degree of anæmia, and cytological examination of the blood. To a less extent I am guided by the symptoms, clinical findings in the patients, and the effect of treatment. The pre-sprue condition is often of an insiduous onset without anæmia, and symptoms of typical sprue are found to develop within a few years, if the case be not diagnosed and properly treated. These pre-sprue cases are included in the list of the 27 cases. Roughly these cases can be divided into (1) sprue without marked anæmia, and (2) sprue with different grades of anæmia, the severest grade passing from a pernicious type to aplastic type.

Laboratory technique.

It is always necessary to describe the technique adopted in the examination of the blood. Many of the errors that have been pointed out by Cols. Knowles, Acton and Dr. B. M. Das Gupta in their paper on "Puzzles and fallacies in the examination of stained films in the

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tropics" published in *The Indian Medical Research Memoirs*, Memoir No. 13 of June 1929, have been avoided.

In preparing blood films particular care is taken to use always new or unused slides cleaned very well with chamois leather. Glass slides are found to be much more useful and easier to work with in the tropics than the cover slips advocated by Piney or the cover slips of mica advocated by others. For taking blood, one of the fingers is usually chosen. It is held tightly in the left hand, cleaned well with absolute alcohol to prevent extraneous contamination. The finger is allowed to dry, for this is important in the tropics lest sweat or alcohol over the finger should cause hæmolysis of the blood. It is often difficult to draw the necessary quantity of blood for all examinations without unduly squeezing. So two pricks, one a slight one, just to win the confidence of the patient, and the other a deep one are taken. The first drop is taken on the paper of the Tallquist hæmoglobinometer and the next drop on the slide for differential count and examination for parasites, if any. The blood from the second puncture is utilised for the red cell and leucocyte counts. In children one good prick will generally suffice.

A drop of blood is taken half an inch from one end of the slide without the slide touching the finger. With the shorter edge of another slide a thin film of blood is spread gently over it, so as to make the different types of leucocytes more evenly distributed. After the film is completely dry it is ready for staining. Some hæmatologists practise and advocate keeping the blood films for 24 hours before staining. But their practice and suggestion are a positive disadvantage owing to the liability of unstained blood films getting deteriorated and the likelihood of aerial contamination with protozoal cysts, bacteria, yeasts and fungi, etc., which are so troublesome to hæmatologists in the tropics.

Staining.

Though Schaudinn's fluid fixative with staining by Heidenhain's iron hæmatoxylin method is the ideal method so far known, the Romanowsky methods of staining are adopted here, as our "normal" conceptions of hæmatozoa are derived from such staining. Distilled water free from all protozoan infection is used for diluting the Leishman or Giemsa's stain (*Bodo* seems to be the commonest contamination in our laboratory). The film is fixed with methyl alcohol and stained with Leishman's stain (Merck's) or by Giemsa stain, or by a combined Leishman's and Giemsa's stain. This latter method of combined staining gives satisfactory results in our laboratory work and it is as follows:—Cover the blood film with a few drops of Leishman's stain and allow it to remain for 30 seconds to a minute. Add on the top of it, diluted Giemsa's stain so as to cover the entire slide with the stain. Allow the stain to remain for 10 to 15 minutes. Put a glass jar over the slide to cover it. Flush the stain off with distilled water. Allow the film to dry in the air (do not blot with filter paper). Then it is ready for examination. The parasites, if any, retain the stain for 3 to 6 months and afterwards the stain fades. One has to take care that the cedar wood oil put on the slide for examination under the microscope is washed off with xylol every time the slide is examined.

Blood count.

A general view of the entire film is obtained under the 1/6th objective and details of the various corpuscular elements studied under the 1|12th" objective. Either a No. 5 or No. 10 eyepiece can be used. A record is made of the pathological findings. Then a differential count is made of the polymorphonuclears, lymphocytes, mononuclears and eosinophiles. Where pathological cells are found, Schilling-Torgau's method of differentiating the polymorphonuclears is adopted. But in these 27 cases, except in two, there was no necessity for me to make such a count.

An absolute count of both the red corpuscles and the leucocytes was made with the hæmocytometer on the first day of admission of each of the cases. The usual form of Thoma-Zeiss hæmocytometer is used. I did not have the opportunity to use the automatic diluting pipette and therefore am not in a position to give my opinion of it. The pipette is cleaned in the usual way, the final cleaning always being done with acetone and not with ether. Ether gives satisfactory results, if the reaction of it with litmus is neutral. While the author and Dr. B. M. Das Gupta were working, abnormal sizes of the red corpuscles with a diminution of their total number were found in one case, while the blood film and clinical condition of the patient did not warrant such an absolute count. We tried to find out where our mistake was. By doing repeated examinations of the blood of the same patient, we discovered to our surprise that the ether used for cleaning the pipette showed a high acidity towards litmus, most probably due to its being kept in the bottle for a long time. We discarded the ether from this bottle and repeated our count, cleaning the pipette with a fresh specimen of ether. Then our results were found to be in agreement with our clinical findings and the findings in the blood film. We noticed that cleaning the pipette with acetone yielded more satisfactory results than cleaning it with ether. The use of ether to clean the pipette may lead to such a difficulty as we have encountered. My experience is that any such difficulty is obviated by the use of acetone in place of ether. For the dilution for the red cell count one part of blood in 199 parts of the diluting fluid i.e., 1:200 is employed. The diluting fluid used for

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this count was only normal saline. For the leucocyte count a 1:20 dilution was used. The diluting fluid with 5 per cent acetic acid in my experience is found to give more satisfactory results than with 1 per cent of the same acid. The colouring material used for the preparation of the diluting fluid may be anything, though particular workers show preference for particular colours. I used gentian violet in a very high dilution as my colouring material.

The actual counting is done almost within half an hour of taking the blood, in a special counting chamber, Tiefe's modification of Thoma-Zeiss' model. The ruling over the chamber is that of Türck. I had the occasion to use other counting chambers with the rulings of Türck, Zappert, and Neumber and I daresay all of them give equally good results, since the principle of all the types of ruling is the same.

A cover slip is placed over the counting chamber; the diluted blood is allowed to remain in the pipette for at least 10 to 15 minutes, occasionally the pipette being shaken well before its contents are transferred. The first drop is rejected, and the end of the pipette is brought into touch with the edge of the chamber. By capillary attraction the fluid runs easily under the cover slip and covers entirely the ruling, leaving no air bubbles. Counting is made according to the usual method. The counts made with Tiefe seem to be a bit higher than the counts made with the Thoma-Hawksley circular trench with the counting chamber in the middle. I verified this observation in 3 cases of normal individuals (I myself being one of them) and on 7 cases of secondary anæmia with the two counting chambers, and I was led invariably to the same conclusion. As much as 20,000 to 50,000 red cells per c.mm. seem to be the average difference between the counts made in the two different counting chambers. This difference is probably due to concentration of the diluted blood taking place in the counting chamber at either ends of the slide.

Enumeration of blood platelets is often unnecessary since, as a rule in sprue, they are found to be not much affected except for a slight decrease.

Reticulocyte count.

During the examination of the series of cases, I have done a few reticulocyte counts before and after administration of liver extract, with the Thoma pipette used for the red cell counts. Conningham used a half per cent aqueous or alcoholic solution of brilliant cresyl blue, followed by Wright's blood staining. Piney uses a saturated solution of brilliant cresyl blue in absolute alcohol and a drop of blood is taken over a cover slip and lowered on to the stain. Hutchison takes a saturated solution of cresyl blue in 0.85 per cent. of normal saline. I tried all those different methods, but none of them gave very satisfactory counts. Of course reticulocytes on the dried films can be shown, but correct counts are difficult to get.

Since the counts made from dried films are not very satisfactory, I wanted in collaboration with Dr. A. K. Mukerjee to find the best diluting fluid suitable for making an absolute count of the reticulocytes. A number of counts have been made in different proportions of the various ingredients of the fluid and at the time of writing this article I am trying with the following fluid:—

Na Cl. 0.6 gm. Pot. oxalata 0.2 gm. Aqua distillata 100 c.c.	Take 8 c.c. of this solution and add to it 2 c.c. of 1 per cent. cresyl blue.

The results of my investigation I will be able to publish in a subsequent paper. Reticulocyte counts have a great bearing on the prognosis of the case.

Hæmoglobin percentage.

For the sake of quickness and convenience the percentage of hæmoglobin is estimated with the help of Tallquist's scale, with occasional verification of their percentage with Dare's hæmoglobinometer. With Dare's one often finds a much lower percentage of hæmoglobin, when compared with Tallquist's. The Tallquist's gives 5 to 10 per cent. higher results: 5 per cent. is my personal error. In Dare's apparatus the scale is illuminated with an electric lamp, as with this light a better approximation of shades of colour of the blood and the coloured scale can be brought about than with a candle lamp or with sunlight.

Table of cases.

From the table appended one can find at a glance that there are two types of sprue; one with marked anæmia and the other without anæmia. McCay in his excellent work has drawn attention to the difference in the analysis of the blood of male Bengalees as compared with that of the blood of Europeans. I agree with his observations. The red cell counts and leucocyte counts in Bengalees are higher than among the Europeans; while the hæmoglobin percentage and colour index are higher in Europeans than in the Indians. This fact has to be remembered in order to understand correctly the figures for blood analysis given in the table. Out of 27 cases 18 were Europeans and 9 are Indians. The highest percentage of hæmoglobin was 103 per cent. and the lowest 25 per cent. The colour index is pretty high in all the cases. The lowest red cell count in our cases was 857,000 and the blood picture in it is typical of a case of pernicious anæmia. Eight cases showed a severe grade of anæmia. Poikilocytosis and anisocytosis are fairly common in most of the cases and nucleated red corpuscles were found in

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Case number.	Name.	Age.	Hb. Per cent.	Colour index.	R. B. C. count.	Total leucocyte count.	Polys.	Lymphos.	L. Mono.	Eosino.	Other abnormalities.
1	A. C. W. D.	32	103	1.0	4,730,000	5,700	78	13	3	4	
2	S.	13	95	0.9	4,800,000	6,500	69	22	3	6	* Anisocytosis, polychromasia and normoblasts.
3	G. M. R.	35	35	0.7	2,300,000	4,600	66	26	5	3	
4	B. W.	49	69	0.8	3,900,000	8,600	63	27	6	4	Polychromasia, anisocytosis.
5	R.	28	75	0.9	3,860,000	3,400	70	23	3	4	
6	G.	24	55	1.0	2,550,000	4,800	66	29	2	1	
7	L. R.	48	95	0.9	4,930,000	5,600	63	25	9	2	* Anisocytosis, poikilocytosis, normoblasts, etc.
8	P. B.	27	30	0.9	1,680,000	7,800	70	22	3	5	
9	A. P.	33	38	1.6	1,200,000	2,800	68	26	3	2	Anisocytosis.
10	C. B. T. N.	34	60	1.8	1,620,000	4,500	58	34	4	4	
11	B. K. A.	44	90	0.9	4,600,000	3,500	69	22	5	4	
12	M.	27	68	0.8	3,980,000	2,300	74	18	4	4	
13	P. M.	54	60	0.8	3,600,000	6,250	70	23	4	3	Anisocytosis, polychromasia, poikilocytosis.
14	S.	28	90	0.9	4,800,000	4,100	72	21	3	4	
15	J.	30	95	1.1	4,216,000	6,600	79	16	2	3	
16	A.	12	100	1.0	5,200,000	6,800 W. B. C. count.	72	20	3	5	
17	Dy.	35	25 Tallquist's 18	1.6	1,100,000	2,200	62 *	30	4	6	* Normoblasts. Türck cells. Cabot rings. Howell-Jolly Bodies. Polychromasia, poikilocytes, anisocytosis. * Neutrophiles { (a) Myelocytes .. 1; (b) Immature forms (metamylocytes) 1 } Scheme of Schilling-Torgau. (c) Band form .. 15; (d) Multilobed .. 45
18	B.	32	98	1.0	4,850,000	6,250	75	22	2	1	
19	B.	24	50	0.7	3,500,000	3,500	53	40	5	2	Polychromasia, anisocytosis.
20	F.	42	90	0.7	5,800,000	8,400	75	20	4	1	
21	J.	14	75	1.1	3,150,000	4,200	67	27	4	2	
22	N. K.	32	60	1.2	2,470,000	8,300	71	20	3	6	Poikilocytosis, achromasia, anisocytosis.
23	S.	38	50	0.9	2,800,000	3,600	57	29	8	6	Poikilocytosis, anisocytosis, achromasia and punctate basophilia. Howell-Jolly Bodies seen.
24	R.	18	75	0.8	4,410,000	3,400	66	28	4	2	
25	S. N. M.	23	98	1.0	4,850,000	3,800	75	22	2	1	
26	C.	12	85	0.8	4,980,000	6,250	70	24	2	4	
27	Dy.	48	28	1.7	857,000	Not done	50	41	4	5	* Poikilocytosis, anisocytosis, megaloblasts, polychromasia, punctate, basophilia. Increase of reticulocytes after 6 days' treatment with ventriculin. (a) Myelocytes .. 0; (b) Immature form (metamyelocytes) .. .. 1; (c) Band form .. .. 18; (d) Multilobed .. .. 31 — Schilling-Torgau.

In these cases marked * I have been put to the necessity of taking the relative proportion of the normoblasts to that of leucocytes. If this is not done, the absolute count of W. B. C. will be found to be higher.

Gigantoblasts were not found at one case. Polychromasia, achromasia and punctate all. Polychromasia were also met with. Severe anæmia basophilia of aplastic type is very rare. In the majority of cases there is a high eosinophile count. The percentage of eosinophiles when taken with the absolute count of the leucocytes gives a fairly good idea of the number of eosinophiles per c.mm. of blood. One is inclined to call a case one of high eosinophilia only if there is an increase of eosinophiles to the extent of 200 to 250 per c.mm. The percentage of eosinophiles by itself, I am inclined to hold is no indication of the existence or otherwise of high

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eosinophilia. For instance, in case No. 17 the eosinophiles were 6 per cent. This is pretty high. Such a state is easily mistaken as indicating eosinophilia. In it the total leucocyte count was only 2,200 per c.mm. The total number of eosinophiles per c.mm. was only 132. Therefore it cannot be said that in this case there was an increase of eosinophiles. We generally find an increase of eosinophiles in normal Indians. It is a fairly common incidence to have as many as 3 to 4 per cent. of eosinophiles. Prognosis is dependent on the total leucocyte and the eosinophile count, and not so much on the red cell count. Increase of total leucocytes with eosinophile rise is always a good sign. Their rise indicates that the bone marrow is responding to stimulation by the toxin. In all the cases the total leucocyte count is extremely low. Colonel Acton observed cases with 200 to 500 leucocytes per c.mm. in cases of asthenic diarrhœa among Indians, which had symptoms of typical sprue. These are the worst cases. There is a relative increase of mononuclears, but it is not of much significance. A slight diminution of the percentage of polymorphonuclears is fairly common and the nuclear lobes in the neutrophiles are of importance and it is to this we are to look especially.

In conclusion, I desire to express my thanks to Lieut.-Col. H. W. Acton, I.M.S., for his kindness and valuable assistance, but for which it would not have been possible for me to prepare this paper.

NOTES ON PAINLESS CHILDBIRTH AND INFANT FEEDING.

By H. WILLIAMSON, O.B.E., M.D., F.R.C.S. (Edin.), MAJOR, I.M.S.,

Civil Surgeon, Sibi.

ONE night, several years ago, in another Province, I was suddenly awakened by a loud banging at my front door and cries of "Sir, for God's sake come and save my sister's life." I pacified my caller sufficiently for him to allow me to put on a dressing gown over my pyjamas and went with him to see his sister. I found a primigravida who had been in labour forty-eight hours, with a large baby, a weakly contracting uterus, a good pulse and a flat pelvis, above whose brim the baby's head was floating freely. The membranes had ruptured early in labour and there was no sign of fœtal life, but I thought it worth trying a forceps extraction before proceeding to craniotomy. Low Cæsarean section was then in its early days, the surroundings were unsuitable, and the fœtus almost certainly dead. As I feared, the forceps proved a failure, so I performed craniotomy and removed the child.

Now the interesting thing about this patient was that on going into the history I found that during the preceding forty-eight hours she had been given two full (one c.c.) doses of pituitrin. Somewhat to my surprise no damage had been done to the uterus and she made an uninterrupted recovery.

This experience somewhat lessened the awe in which I had formerly held pre-natal pituitrin, and I thought it might be worth trying small doses of this drug in those familiar cases where the pains die away as soon as chloroform is given.

We are now, happily, past the era when it was thought immoral to give chloroform to women labouring of child lest we should thereby mitigate the curse of Eve ("In sorrow shalt thou bring forth children"), and most obstetricians, especially those who, like so many in this country, have had to attend their own wives, give chloroform in childbirth.

Very often, however, the relief that chloroform gives seems to be due almost less to its anæsthetic effect than to the fact that it makes the pains die away or even stop altogether. When this occurs I cut down or stop the chloroform and wait to see what happens. As the patient's consciousness returns so do her pains, often with greater force than before. It is quite usual for her to ask at this stage whether the baby is a boy or a girl, and when told that it has not arrived she generally says "Oh dear, hasn't it come *yet?*" and dozes off into unhappy semi-consciousness. With the next pain she wakes up properly, so light chloroform anæsthesia is again begun. It often happens that one can now continue giving chloroform during the pains without causing excessive delay, the child being born in due course without the mother's knowledge.

If, however, after half or three-quarters of an hour of this light anæsthesia the pains continue weak and the child seems to be making no progress, the patient should be put more deeply under and a careful aseptic vaginal examination made. If the occiput is anterior, the head flexed, the os fully or nearly fully dilated and no obstruction present, three minims of pituitrin should be injected into the mother's arm. The light chloroform is continued and after seven to twelve minutes good strong natural pains begin and the baby is usually born within an hour. If at the end of an hour the pains show signs of weakening another three or even five minims of pituitrin may be given, which will usually produce the baby.

In those cases where the baby's head is on the perineum but the uterus does not seem quite strong enough to expel it, five minims of pituitrin will generally do it much better than forceps.

Talking of the perineum, I fear it is a fact that while most doctors know how to deal with an abnormal case, many, particularly the younger ones, do not, to judge from the number of perineal tears one sees, always know how to deal with a normal case. The golden rule is, of course, "Don't hurry," to which I may

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add the Queen Charlotte's Hospital maxims "Deliver the head slowly between pains, and never allow it to extend till the occiput is past the pubes and the bi-parietal diameter outside the vulva."

Nor should the shoulders be forgotten. Many a good perineum has been torn by the shoulders after the head has been carefully delivered. Just as in driving a motor car, if you do not wish to die you must keep your eye on the road, so in conducting a labour, if you do not wish to tear the perineum you must keep your eye on the baby. How often has the attendant turned round to get a swab and on turning back found that a sudden strong pain has occurred and torn the perineum! Personally, when the head is born I hold it back with my left hand, and while the fingers of the right hand feel for the cord round the baby's neck I take the opportunity to sweep the anterior arm gently over the chest and deliver it. I then draw the child's shoulders gently forward and carefully deliver the posterior shoulder. This manœuvre reduces the shoulder diameter to be born, but must be done with care, so as to avoid damage to the mother's urethra, etc.

In primiparæ, or after early rupture of the membranes—which in a vertex presentation should make one at once suspect an occipito-posterior position—the first stage of labour is generally very tedious, as it takes a long time for the cervix to dilate. It is in these cases that "twilight sleep" is a great boon, though the patient should be under competent supervision if this treatment is adopted. What is agony to some people is only discomfort to others, but if the mother seems to be really suffering and it seems likely that at least four hours will pass before the birth of the child, a quarter of a grain of morphia with a hundredth of a grain of atropine and a hundred and fiftieth of a grain of hyoscine (Scopolamine) may safely be given, followed, if necessary, at hourly intervals by doses of one four-hundredth of a grain of hyoscine, but the morphia must not be repeated. The patient, if well-to-do, will generally say that she felt as if she had drunk too much champagne. When the second stage of labour is under way, chloroform and, if necessary, pituitrin, may be given.

"Ovarian Residue" (P. D. & Co.), when injected subcutaneously in one c.c. doses for "touching off" cases in which labour is overdue, seems to have the curious property of rendering the first stage more comfortable than usual. I found it most successful in one case, but have not yet had enough experience of it to give any opinion of value.

Like Dr. Johnson's crab, we seem to be walking backwards, but before leaving this subject I should like to emphasize the importance of ante-natal supervision, which is one of the greatest boons that modern science has conferred upon women, not to mention their children. Indeed, one is amazed that nobody thought of it before. I suppose shyness about the honourable state of pregnancy is responsible. The man spoke truly who said "The good obstetrician of the future will not be the man who is best at dealing with a difficult case, but the man who never has one to deal with."

With regard to infant feeding, there is, of course, no question that the breast-fed baby is the best fed baby, but it is not my experience that if the mother's milk does not suit the baby nothing else will. Fortunately for us all, it generally does suit the baby, especially if the mother follows Col. Green-Armytage's advice and eats plenty of fruit and vegetables and drinks plenty of water, both before and during lactation: it is wonderful how by doing this a mother can improve both the quantity and the quality of her milk. Again, one wonders why nobody thought of it before. Consider the cow, which lives on grass and water!

There is some difference of opinion about whether the baby should be fed from one or from both breasts at each feed. The latter plan is the better, one feed starting with one breast and the next with the other. If the mother finds it difficult to remember which breast to begin with, she can write on one side of a card "Start with the right" and on the other "Start with the left," turning the card over at each feed.

It is important to know the signs which show that the mother's milk is beginning to give out, and the greatest of these signs is constipation in the baby. It may almost be taken as an axiom that in a previously normal breast-fed baby constipation means starvation. Often and often a haggard mother has brought her three or four months old baby to me with the story that until about a fortnight ago his motions were "beautiful," but now nothing seems to move him. She has given him castor oil (the worst possible thing), olive oil, soap sticks, enemata, grey powders and magnesia, but nothing seems to make any difference, he is constipated, fretful, and refuses to put on weight. All that is needed is a bottle, or perhaps two bottles a day. The baby at once begins to improve, the mother gets rest, both mental and physical, and all is well again. In fact, the mother sometimes improves so much that she is later able to cut down the bottle feeds. When a breast-fed baby begins to get constipated the mother's breasts should be examined before a feed to see if they are full or empty (such a simple thing to do, and so often not done) and the baby weighed before and after two or three feeds. If a laboratory is handy the milk may be analysed for fat content. If all these findings are satisfactory the mother is probably not eating enough fruit, but if, as is usually the case, the quantity is deficient, the baby needs, not purgatives, but

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one or two bottles a day. I have found that "Sunshine Glaxo," with a teaspoonful of Mellin's Food to each feed, cures most of these cases. Especially in India, where cow's milk is so variable, babies do very well on "Glaxo" or other milk foods if they are also given a daily teaspoonful of fruit juice with water and a little sugar; if fruit is unobtainable tomato juice does very well.

When mothers are advised to introduce artificial feeding, they are apt, especially with a first baby, to be appalled at the prospect, as well they may be if they are given elaborate books, elaborate advice and elaborate apparatus. When running out of milk, women are apt to be peculiarly sensitive and irritable and to make mountains out of what would ordinarily be domestic molehills. The more worried they get the less milk they have, so it behoves us to break the vicious circle, and this can best be done by making things as simple as possible. I have found it good practice to advise the mother to make the amount of food roughly proportional to the baby's weight. With "patent" foods one measure (teaspoonful) of the powder goes to one ounce of water and a little less than one ounce of the mixture to each two pounds of the baby's weight. For instance, a twelve pound baby will take a little less than six ounces at each three-hourly feed. The same roughly holds good for cow's milk when it is the only form of nourishment. This is a simple calculation which any mother can make and in practice it works very well.

Should a baby be fed three hourly or four hourly? Here, again, the baby should be studied rather than the books. Most babies are happier on three-hourly feeds, but it often happens that when they are six or eight months old they seem to lose their appetites and not want all their feed. It is then a good thing to put them on to four-hourly feeds.

Another thing I have noticed is that the ten p.m. feed can often be dispensed with almost from birth, though this is by no means always the case. It often happens, however, that after the seven p.m. feed the baby settles down very snugly and if left will sleep peacefully till twelve o'clock or later, by which time the mother has had some sleep too. The child is then fed, after which it will sleep till six or seven next morning. The advantage of this is that the twelve soon becomes one, the one two, and so on, until at the age of a very few weeks the child (and the mother) will sleep all night. One of my children (a girl) did this at five weeks and put on seven ounces a week steadily. Another (a boy) refused to sleep all night unless he had a ten o'clock feed, but girls are notoriously better babies than boys.

If a child has to be bottle fed from an early age it should not be kept on "patent" foods beyond the age of four months or so, as, unless the local cow's milk is really bad, it is generally better and cheaper to give it boiled undiluted cow's milk with a grain of citrate of soda to each ounce. The cow's milk should be gradually substituted for the "patent" food, about a fortnight being spent in making the change. If the child is doing well the citrate of soda may be gradually cut down and finally omitted.

I have purposely not touched on the frankly pathological, but only on those slight variations from the normal which are so frequent, so worrying, and so seldom explained in textbooks. In the course of a fairly wide experience I have often thought that obstetrics and infant feeding are fraught with a good many unnecessary nightmares, and it is with the object of banishing some of these and advocating treatment on simple lines that these notes are written.

AN INVESTIGATION INTO THE CLOGGING OF THE FILTER BEDS AT TOPCHANCHI WATERWORKS DURING HOT WEATHER.

By B. K. MANDAL,

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IN April 1929 an investigation was begun to determine the cause of the mysterious clogging of the filter beds at Topchanchi Reservoir during the hot months of each year.

Eight samples of raw water drawn from the first valve of the lake were examined and gave indications of much organic matter produced by vegetable decomposition. Traces of iron were noticed all along in these samples. It is unusual to find the presence of stable iron compounds in the surface waters of a lake.

Twenty samples of water drawn from the second valve were analysed and showed signs of growth, as well as decay, of low forms of vegetable life and the presence of iron sufficient to choke the filter beds and to foster the growth of *Crenothrix*, one of the clogging agents. The temperature of the water plays an important part, 70°—80°F. being congenial to the growth of low forms of vegetable life, whereas the temperature of the surface water, which is over 85°F., helps the vegetable decay. The growth as well as the actual decay of vegetable life is amongst the factors which cause clogging of the filter beds. The vegetable decomposition produces soluble organic matter, thus diminishing the quantity of dissolved oxygen and ultimately dissociating into albuminoid ammonia.

Curiosity was expressed by the authorities as to why it is that only in the hot weather does the trouble arise year after year. The explanation is simple. Had it been feasible to draw water throughout the year from the first or uppermost valve, the possibility of maintaining the maximum rate of filtration consistent with good analytical results would have

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been easy at all times, irrespective of the growth of vegetable life and the presence of iron.

As the water level sinks in the lake in summer, there is no alternative but to draw water from the second chamber, where the quality and character of the water are distinctly different from those of the surface water and only favourable for choking the filter beds. The temperature, the increase of vegetable organic matter in water, together with a simultaneous reduction in dissolved oxygen and the evolution of carbon dioxide favour the growth of low forms of vegetable life and the concentration of iron in a soluble state.

It is interesting to note that the growth of a *Crenothrix*, unlike other forms of vegetable life, increases free ammonia (Thresh). This is corroborated by our own experiments, thus confirming the presence of *Crenothrix* by chemical tests. This can be explained by the fact that iron which is always associated with *Crenothrix*, very appropriately called *iron-bacterium*, reacts with the ultimate reduction of nitrate into free ammonia.

The vegetable organic matter, sulphuretted hydrogen and carbon dioxide present in water of the second chamber are responsible for the concentration of iron in soluble form as ferrous bicarbonate. But when the water flows from the lake and scatters over the filter beds, coming into contact with air and light, this unstable compound of iron takes on a gelatinous state which is probably the main factor in clogging the fine crevices of slow sand filters.

TREPONEMA VINCENTI AND *BACILLUS FUSIFORMIS* AS POSSIBLE CAUSATIVE AGENTS IN A GROUP OF CASES RESEMBLING MILD INFLUENZA.

By H. P. MANGHIRMALANI,
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MANY observers have demonstrated the presence of treponemata especially *T. vincenti* in various conditions:—

1. There are certain necrotic and gangrenous infective processes in human beings, such as ulcero-membranous angina, hospital gangrene, noma, fœtid bronchitis, and gangrenous laryngitis in which spirochætes have been frequently demonstrated. Of these one of the chief is the so-called spirillum described by Vincent (1896, 1899) now known as *Treponema vincenti* (Extract from Topley and Wilson—*Principles of Bacteriology and Immunity*—1929).

2. It is not clear whether *Treponema vincenti* is responsible for the various necrotic processes in which it is found or whether it is a secondary invader. Since the organisms may sometimes be demonstrated in the depths of infected tissues it is possible that it may possess actual invasive properties (Ellermann, 1907).

3. Treponemata have been isolated from the sputum of tubercular patients (Bezancon and Etchegoin, 1926) and from bronchial and pulmonary lesions (Bacigalupo, 1928), but we know nothing of the relationship of these organisms to each other or to *Treponema vincenti*.

My attention was drawn to *Treponema vincenti* persistently occurring along with *Bacillus fusiformis* in a group of cases clinically resembling mild influenza.

During the month of April and the early part of May 1929, there were a few cases amongst the troops at Jhansi which were diagnosed "mild influenza." Twenty-five such cases were treated at the Indian Military Hospital, Jhansi. The symptoms in most of these cases were those of fever, headache, pain in the body, coryza with congestion of the throat. In eight of these cases a definite bronchitis was present, but in no case was there any sign of the lung tissue being involved in the inflammatory process. The fever came down to normal in most of these cases in 48 hours. In three cases the pyrexia lasted 3 or 4 days. The highest temperature reached was 104°F., the average being 101—102°F.

The symptoms as met with in the patients were:—

Pyrexia—24 cases—one case had no fever throughout the illness.
Congestion of the throat—24 cases—in one case the throat was not congested.
Headache—13 cases.
Pain in the body—10 cases.
Hæmoptysis—2 cases.
Tonsils enlarged and inflamed—4 cases.
Bronchitis—8 cases.

An attempt was made to isolate the causative organism. The procedure adopted was as laid down for the isolation of the influenza bacillus in Parke and Williams' *Pathogenic Micro-organisms*, 1925 edition.

The sputum was collected daily in sterile test tubes from the day of admission to the hospital to the day the patient was discharged. Throat swabs were also taken from the nasopharynx. Cultures were made on blood-agar, the growth being examined after 24–48 hours. Direct examination of films of sputum and of smears from the throat swabs stained by Giemsa's stain, weak carbol fuchsin and Gram's stain was carried out. The influenza bacillus could not be detected in any of these cases either by culture or by direct method. In all these cases *Treponema vincenti* were found in large numbers along with *Bacillus fusiformis* in the films of the sputum but never in the smears from the throat swabs. Weak carbol fuchsin demonstrated well *T. vincenti* and Giemsa's stain brought out the one or more granules in and the double pointed appearance of *B. fusiformis* very clearly. In most cases *T. vincenti* and *B. fusiformis* disappeared within 3 to 4 days. In five cases they persisted for 7 or more days. In no case was one organism discovered in the absence of the other. None of the throat swabs were positive to *T. vincenti* or *B. fusiformis* although all

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the cases excepting one had congestion of the pharynx. In every case including one in which no congestion of the pharynx was present, both the organisms were present in the sputum. Throat swabs were taken prior to any treatment being applied to the throat in all cases. The question of faulty technique with regard to the throat swabs will also not seem to arise as during this period eight throat swabs from cases of tonsillitis were received in the laboratory for examination for *B. diphtheriæ* and other organisms, in none of which either *T. vincenti* or *B. fusiformis* was found to be present. The mouths of many of these patients were free from dental caries, gingivitis, stomatitis, etc.

It may be pointed out that no definite claim is made that either *T. vincenti* or *B. fusiformis* is considered to be the causative organism in these cases as the evidence is obviously inconclusive. No animal inoculations were carried out, but apparently *T. vincenti* injected subcutaneously into guinea-pigs usually gives rise to no harmful effects as stated by Tunnicliff in 1906. Nevertheless it is thought that it is probable that in these cases the treponemata were the causative agents of the symptoms, and that their occurrence in this group of cases is of sufficient interest to be recorded.

My thanks are due to Jemadar Gurcharan Singh for his help in this work.

CORRIGENDA.

By an unfortunate oversight, the letterpress to the colour plate facing p. 6 in our issue for January 1931 was not printed. It should read as follows:—

Fig. 1.—Schizont rosette of *P. falciparum* ingested by a large hyaline mononuclear leucocyte. Case 5.

Fig. 2.—Merozoite of *P. vivax* ingested by a polymorphonuclear leucocyte.

Fig. 3.—A single field from a blood film from Case 5, taken on 2nd September, 1930, showing growing trophozoite and early schizont forms of *P. falciparum* in the peripheral blood.

Fig. 4.—Schizont rosette of *P. falciparum* ingested by a polymorphonuclear leucocyte. Case 5.

Fig. 5.—A single field from a blood film taken from a diabetic patient who contracted a fatal infection with *P. falciparum*, showing growing trophozoites and schizont forms in the peripheral blood.

In the map opposite p. 12, showing the distribution of filariasis in India, the letterpress below the map should be deleted. It refers only to the blank map forms.

A Mirror of Hospital Practice.

A CASE OF CELLULAR EMPHYSEMA.

By G. B. ARCHER, M.D., Toronto,
C. M. S. Medical Mission, Ranaghat.

A MOHAMMEDAN GIRL, aged 4, reported at the dispensary on September 5th. The complaint was fever for three days, and a swelling over the suprasternal notch. This was about the size of an egg and had the crackling of cellular emphysema. There was no history of injury. She was seen on this occasion by our house physician, who advised the parents to leave her in hospital but this they refused to do. On September 7th, the child was brought again and I admitted her into hospital. There was no fever, but the cellular emphysema had extended over the neck to the cheeks, the abdomen and back to below the level of the umbilicus, and the arms to the elbow joints. The child was restless and had slight dyspnœa and cough, but nothing abnormal could be heard in the chest. The emphysema extended down the arms to the wrists. On the 10th the emphysema began to subside, leaving the arms first and becoming less marked over the chest and abdomen, and to-day, September 17th, the emphysema has entirely disappeared, the child was quite well and was discharged.

The only treatment followed was bandaging the chest and arms, and small doses of tinct. camph. co. to allay cough and restlessness.

A CASE OF ANOMALOUS DIAPHRAGMATIC MOVEMENTS.

By R. N. TANDON, B.SC., M.B., B.S., D.M.R.E. (Cantab.), T.D.D. (Wales),
Assistant Superintendent, King Edward VII Sanatorium, Bhowali.

A FEW months back, a young man, aged about 40 years, a case of pulmonary tuberculosis, was sent to me for *x*-ray examination of the chest. The patient was a resident of the province of Bihar, and had come to Bhowali for treatment. He had been suffering from this disease for about 3 years, and at the time of examination was practically without symptoms, and was taking long walks as advised by his physician. Radiological examination showed that the disease was confined to the left lung in the upper and the middle zones. No evidence of infiltration could be made out, the lesion had almost completely fibrosed and was badly pulling on the trachea and the aorta. The contralateral lung was extraordinarily radioluscent. However, contrary to what one would expect, the left side of the diaphragm was moving much more freely than the right, as a matter of fact the limited excursions on the right attracted attention. No previous history of pleurisy on the right side was forthcoming and no radiological evidence of disease could be found in that lung. On enquiry it was found from the patient's physician that some prolonged expiration was noted by him on the right side.

One is inclined to think that the anomalous movements may be explained by the existence of compensatory emphysema on the right side, which restricted the diaphragmatic movements. If it be so, one is at a loss to understand why the compensatory emphysema, if it was to occur, did not do so in the healthy part of the left lung.

SKIN-GRAFTING IN COMPLETE AVULSION OF THE SCALP.

By K. L. BASU MALLIK, M.B.,
Chief Medical Officer, Ludlow Jute Co., Ltd., Chackasi, Howrah.

COMPLETE avulsion of the scalp must of necessity be a comparatively rare occurrence and the following case is reported to show what can be done to such patients out in the tropics by way of skin-grafting.

Two photographs are reproduced to show the condition of the scalp before and after the skin-grafting.

T. D., Hindu female, aged about 26 years, was employed inside the "preparing" department of a jute mill. Her occupation was that of a feeder of jute

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slivers into what is known as the drawing frame. While engaged in her work her hair, which was not tied up properly, got entangled into the back shaft, which revolves very rapidly, and wound round and round; finally, the pull tore the whole of the scalp away, including a part of the forehead and right temple skin. The whole affair was over in a few seconds; the patient suffered from severe burning sensation on the denuded area and from shock. She was immediately admitted into the Ludlow Jute Mill Hospital and was successfully tided over the initial shock.

The accident happened on 6th February, 1930. On 12th February, 1930, a very large subcutaneous fatty tumour was going to be removed from a healthy and young Mohammedan, and several Wolfe and Reverdin grafts were made from the tumour before it was removed. In four days all the grafts sloughed out.

Fig. 1.—Photograph taken 10 days after the accident before skin-grafting.

After this the patient became ill with malarial fever and was found to be suffering from a fœtid vaginal discharge. Her husband gave a history of gonorrhœa and syphilis. Her blood serum was tested and Menick's sero-reaction was + + +. It was decided to wait, and she was put on a quinine-iron tonic and vigorous antiluetic treatment until 27th February, 1930, when the first skin-grafting operation was attempted with her own skin.

Ten skin-grafting operations had to be done to cover the whole scalp, every ten days; the technique adopted was the same in each case:—

The method.—The inner and back sides of the thighs were selected. The skin was prepared under the strictest asepsis. A subcutaneous field block was produced over a rectangular area by injecting 1 per cent. solution of novocain with a Labat's local anæsthesia syringe. Thin Theirsh grafts of various sizes, varying from 1 inch by ½ inch to 3½ inches by 2 inches, were sliced off and placed on the dry and sticky granulation tissue on the scalp.

Dressing.—This was dressed with perforated gutta-percha tissue sterilised by soaking for 48 hours in 1 in 1,000 mercury bichloride solution, and dressed with gauze soaked in normal saline. The dressings were soaked with normal saline every 6 hours and at the end of 24 hours the gauze over the gutta-percha tissue was removed and the condition of the grafts inspected through the transparent gutta-percha, and accumulation of any discharge was gently pressed out through the numerous windows in the gutta-percha. Fresh sterile gauze soaked in warm normal saline was put on again and the dressings soaked every 6 hours with warm normal saline for the next 24 hours. At the end of 48 hours the dressings were removed, the gutta-percha was lifted and washed in 1 in 1,000 mercury bichloride solution, and the grafted surface washed very carefully with normal saline. By this time the grafts had taken on a hold. The wound was then covered with gutta-percha and wet gauze, and soaked morning and evening for the next 48 hours, at the end of which time the grafts were firmly rooted and were dressed with sterile vaseline.

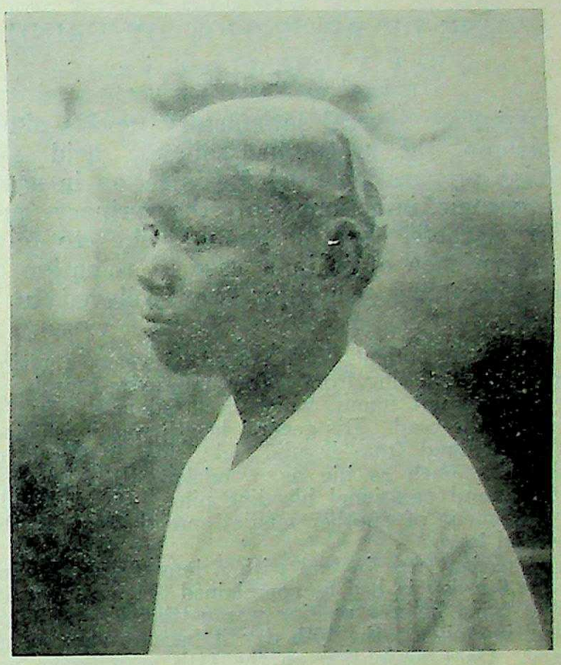

Fig. 2.—Scalp covered completely.

Preparation of granulation tissue.—All discharges must stop before a granulation is deemed fit for grafting on. Whenever there was any excessive granulation alcohol dressing (sterile gauze soaked in rectified spirit) was applied over-night. This caused a somewhat burning sensation and the superficial layer of the granulation tissues sloughed off. Sometimes it was followed by a serous discharge in which case the selected area was dressed with dry sterile gauze. Next morning when the gauze was taken off the site was washed with warm normal saline and a saline dressing applied 2 hours before the operation. At the time of operation the saline dressing was taken off and a thin layer of dry sterile gauze put on to cover the wound. By this method a perfectly sticky and smooth granulating area was ready for grafts.

The variety of grafts.—Theirsh grafts were most successful. It was noticed that pieces which were uniformly thin always died out. The pieces whose centre was the thickest (but not containing any subcutaneous tissue) and which gradually thinned away at the margins gave the best results. Wolfe grafts were a total failure.

Relationship of high atmospheric temperature.—It was noticed just before the rains broke, when the air temperature was very high—over 100°F., that none of the grafted skin would "take" and further that many of the recent

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and rooted grafts died and the edges of others simply degenerated and died, so excessive air temperature is inimical to the grafts.

Remarks.

(1) Extensive skin-grafting operation may be carried on in the tropics as long as air temperature is not too high.

(2) The best kind of grafts are the Theirsh grafts.

(3) There is very little chance for a heterogeneous skin-graft.

A CASE OF RETENTION OF URINE.

By P. V. DHEBRI, M.B., B.S.,
Thakurdwar Road, Bombay.

THERE are several satisfactory reports about cylotropin, the urotropin, salicylic acid and caffeine preparation used for injection in acute and chronic infections of the urinary and biliary tracts, but I should like to give my experience of it in a case of retention of the urine. The condition was relieved in 6 hours.

History.—A patient, V. K., aged 65 years, a retired official, was suffering from a fracture—extra-capsular of the neck of left femur, which occurred as a result of a fall on the road. His general health was satisfactory but he suffered from hernia, right side, hydrocele on both sides, each as big as a cricket ball, enlarged prostate, and occasional bleeding piles. He was under the treatment of another medical practitioner for this fractured leg.

The patient was in bed with a long Liston's splint. On the 9th day in bed he complained that the quantity of the urine he was passing was getting less and less, and ultimately on the 10th day it became very scanty indeed. On examination on the 11th morning he was found to be running a temperature of 101°F., and a big tumour over the symphysis pubis, reaching up to the umbilicus, was noticed.

A diagnosis of distended bladder with retention of urine was arrived at. A catheter was passed and the urine drained off, and this procedure was adopted on the 12th, 13th and 14th day as well. My professional brother who was treating him for the fracture was called in and informed of this complication. I had suggested giving an injection of cylotropin, but my colleague would not agree, and ordered hot fomentations. To the patient's misfortune no relief was obtained. The patient objected to any injection as he was old, and I had to stand by in silence.

During this period, his illness increased to the extent of showing signs of urinary poisoning. Therefore, on the next morning, the 15th day of his illness, seeing his condition becoming critical, I took the responsibility upon myself and gave the patient 5 c.cms. of cylotropin intramuscularly in the right thigh. This was at 9 a.m. By 4 p.m. he began passing urine in large quantities, so much so that at 8 p.m. the enlarged bladder could no longer be seen. His temperature dropped down to 99° and he had much relief.

The next morning which was the 16th day, he was given the second injection. His fever that day did not rise, but on the other hand came down to 98° in the evening. The other medical attendant was called in and the patient himself gave his experiences of the two injections. He was given two more, whereafter everything was quite normal and he had no further trouble during his treatment for fracture.

My colleague subsequently had a similar case of retention of the urine and he had the same satisfactory results with cylotropin.

MENINGITIS AS A COMPLICATION OF DYSENTERY.

By P. L. DESHMUKH, M.B., B.S. (Bom.),
Hon. Clinical Pathologist to B. J. Medical School, Poona.

I WAS called upon to see a case of a male child, aged 14 months, who was being treated for dysentery. The complaint started four days previously with temperature, frequency of stools, and tenesmus. The temperature was continuously at 101°F. to 102°F. with a morning remission of about 1°. For the first two days of illness the stools were scanty, almost bloody and with very little mucus. Later, after emetine had been administered, the blood completely disappeared from the stools. The frequency of the stools, over 40 to 50 per day, for the first two days, was brought down to 30 times after the emetine injections. The fever and the increased frequency of stools with tenesmus continued and hence a mixed infection was thought of. Polyvalent antidysenteric serum was given but had very little effect, either on the temperature or the frequency of the stools. I was called in because the child was rapidly becoming very low. When I saw the child he was almost unconscious and was unable even to recognise his mother. The unconscious state was mistaken for exhaustion and debilitation by the doctor and the parents, but this finding aroused in me a suspicion of cerebral complication which though rarely found in practice has been reported in the textbooks of medicine. Awaiting more definite proof, the child was put on a stimulating line of treatment for the time. The suspicion of the previous day proved to be the reality of the morrow when the next morning the child presented a typical clinical picture of meningitis. The child was completely unconscious with strabismus, rigid and extended neck, and a positive Kernig's sign. The abdominal and the corneal reflexes were diminished, while the tendon reflexes were exaggerated. This might have been due to the increased intracranial tension. The child had developed the peculiar "hydrocephalic cry" which was repeated at the intervals of a few minutes until its death next morning. In view of the rapidly increasing intracranial tension lumbar puncture could not be undertaken at home with safety, so advice was given to remove the child to a hospital for further treatment. The advice was not followed, and the child died next morning of meningitis.

Conclusion.

The first symptom which suggested cerebral complications in this case was unconsciousness, or the so-called "listlessness." So, unconsciousness in a case of dysentery with mixed infection will, I hope, keep my professional colleagues on their guard regarding this unusual fatal complication.

A CASE OF GLANDULAR FEVER.

By PHANI BHUSAN MUKERJEE, L.M.P.,
Medical Officer, District Board, Darbhanga.

GLANDULAR fever, as described by Osler, is an infectious disease of children, characterised by swelling and tenderness of the lymph-glands of the neck, particularly those behind the sterno-cleido-mastoid muscle. The fever is of short duration but the enlargement of the glands persists from ten days to three weeks. In many cases the post-cervical, inguinal and axillary glands are enlarged.

As this sort of fever is rarely met with in practice, I am citing below a case for the interest of readers.

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In October, 1929, I was called in to see an adult Hindu male, aged about 25, a resident of Singhwara, while I was there.

The patient, a student in a Guru-training school, near Dalsing-Sarai, was attacked with fever there, noticed the enlargement of his inguinal glands on the 3rd day, returned home the next day and consulted me.

His temperature was 103°F., pulse 120, and respirations 30 per minute. His tongue was coated, bowels constipated and he complained of headache. There was a slight cough and a few ronchi were audible here and there, on auscultation, on both sides of the chest. There was no enlargement of the spleen or liver.

The inguinal glands were found enlarged, shotty and tender. No abnormality was detected in any other system.

As the patient came from a locality where plague is almost endemic, I, at first, suspected the disease to be this, but during the course of the disease the gradual enlargement of the axillary, submaxillary, cervical glands and of the glands of the scalp, the absence of delirium, thirst or prostration, and above all the absence of any case there at the time, differentiated it from plague.

The fever was of a remittent type and ranged from 100°F. to 102°F.

He was first given a dose of hydrarg. subchlor. followed by saline to move his bowels; later on a simple diaphoretic mixture was continued. He was given tincture of iodine to paint over his glands, and a belladonna plaster was applied over them; this relieved the pain and tenderness, but the enlargement persisted for several days.

The continuation of the fever up to the 3rd week, in spite of the administration of quinine and other antipyretic drugs, reminded me of the use of iodine intravenously. Accordingly, on the 18th day of the disease, I gave him an injection of 0.5 c.cm. of tincture of iodine, diluted with 5 c.cms. distilled water. There was a reaction in the afternoon, but the temperature came down to normal the next morning. He was given a second injection of 1 c.cm. of tincture of iodine, on the 3rd day, and there was no further rise of temperature.

Remarks.

1. This was the first case of this nature I have come across in my 15 years of practice.
2. It occurred in an adult instead of in a child.
3. No other case could be traced either in the locality from where he came or in his house afterwards.
4. The enlargement was first noticed in the glands of the inguinal region instead of in those of the neck.
5. None of the glands showed signs of suppuration and disappeared spontaneously.
6. The fever persisted up to the 3rd week and tincture of iodine injections brought it down to normal.

EFFECT OF MILK INJECTIONS ON TRAUMATIC SYNOVITIS.

By KUMARES CH. BANERJEE, M.B.,
Medical Officer, The Reliance Jute Mills Co., Ltd., Bhatpara P. O., 24-Parganas.

MILK by intramuscular injection is coming to the forefront with the advent of non-specific protein therapy. Its usefulness in gynæcological and general medical practice can scarcely be contested.

Recently we have been using it in cases of traumatic synovitis of the big joints and the effect can well be judged by the results of the following cases:—

Case 1.—B. P., Hindu male, aged 38 years, a jute sangra, was brought to the mill dispensary on the 13th March, 1930. He had been knocked down by a bale of jute against the trolley rail; this had caused hæmorrhage in the left knee joint. He was admitted on the same day into the Chinsurah Imambarah Hospital and was discharged on the 9th of May.

On examination after his discharge it was found that he could hardly stand. The affected joint was swollen, painful, distended and slightly hot to the touch. The limb was maintained in a semiflexed position and the presence of the fluid could be detected.

On the 13th of May, 2.5 c.cms. of milk was injected into the gluteal muscles and this injection was repeated on the 16th and 19th, the dose being increased by 0.5 c.c. each time. The reaction that followed raised the temperature to 103° to 104°F., fever coming on with a little rigor; loss of appetite and malaise were marked even after defervescence.

The result which followed was gradual absorption of the effusion until the joint assumed its normal shape, the movements becoming easier.

Another injection was given on the 22nd of May and he resumed work on the 26th of the same month.

Case 2.—N., Hindu male, aged 27 years, injured on the 10th of June, and admitted into the Imambarah Hospital from which he got his discharge on the 10th of July.

The history and physical features of this case were exactly the same as the first one, but his right knee was affected.

Having in mind the effect produced in the previous case we started injections of milk in this case too. The first injection (2.5 c.cms.) was given on 11th July, 1930, and was repeated on 15th July, 1930 (3 c.cms.), and on 22nd July, 1930 (3 c.cms.). Very slight reaction followed, so further injections were given on 24th July, 1930 (3 c.cms.), and on 29th July, 1930 (4 c.cms.).

The progress of this case was steady, the swelling of joint, with its pain, tenderness and difficulty in moving, gradually subsided. He resumed his normal duties on 2nd August, 1930.

Case 3.—B. D., Hindu male, aged 30 years, brought to the dispensary on the 3rd of September with an injured left leg.

The history of the case was that while pushing bales (weight 4 maunds) off a pile, his foot got jammed between two bales. On examination a boggy swelling in the left ankle region was seen. As a preliminary treatment Goulard's lotion was applied and the leg was immobilised by means of a posterior splint. Next day the joint appeared very much distended and hot, and the presence of fluid could be detected. On 8th September, 1930, the first injection of 2.5 c.cms. of milk (whole) was given and this was repeated on the 12th and 16th.

The man was sent back to work on the 22nd of September, there being no sign of the trouble.

As all these three men have to carry heavy weights, we were doubtful about the permanency of the cure. Watch has been kept on them and we are happy to find no relapse of symptoms to date.

The milk used was ordinary milk, but we were careful to procure it pure, and the technique used was as follows:—

After centrifugalising and keeping the sample in a cool place for 3 to 4 hours, the bottom milk was taken and put in a bath of boiling water in a test tube for 10 to 15 minutes; when

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it had cooled down the desired amount was injected.

In the last case we used whole milk without any untoward effect. In each case the improvement was marked within a week from the start of the treatment and cure was effected within a fortnight.

A THREAD LIGATURE ROUND THE PENIS.

By MANZOOR HASAN JAFFRI, L.M.P.,

Medical Officer, Bayana.

A HINDU boy of 13 years was brought to my hospital on a *charpai* on 30th November, 1930. There was a deep sloughing wound round the circumference of his penis. The distal portion was œdematous to about 4 inches in length and 2 inches in diameter, while the proximal portion being of the normal size measured only about ¾ inch in length. He was running a temperature of about 100°F. Micturition was normal except that a few residual drops were decomposing in the slit of the œdematous prepuce.

No history whatsoever could be made out from the patient, nor from his father. The patient being a *Goala* (shepherd) and of tender years, ligature and paraphimosis were thought of, but there was no evidence of these. The ulcer was then cleansed and dusted with pure iodoform, the œdematous portion punctured and much of the serum squeezed out and the parts dressed. Next morning the swelling was the same, the circular cut still deeper, and complete self amputation appeared inevitable. Again the parts were cleansed thoroughly and carefully, and when the whole of the slough was removed there appeared a double thread ligature buried deep in the bed of the circular cut, which was at once removed with a pair of scissors. Four stitches were put in, scarifications were made over the œdematous portions, and an acriflavin dressing was applied.

Next morning the œdema being the same, the sutures had given way, but the temperature had subsided. Therefore the wound was cleansed, sutures removed, the parts put in contact, two strips of adhesive plaster applied, one over the dorsal and the other over the ventral aspect of the penis, acriflavin gauze wrapped round and dressing applied. A circular cushion was next contrived out of a clean rolled up *dhoti* and slipped smoothly over the dressed penis to keep it in a vertical position and so to take off the weight of the œdematous portion. Next morning when the dressing was removed more than half of the œdema had subsided, the ulcer appeared to be healing and the parts partially united. The same dressing and contrivance were continued and in a few days the ulcer healed up completely leaving a circular scar round the penis.

DYSPHAGIA AND APHONIA AS COMPLICATIONS OF MALARIA.

By R. C. MAJUMDER, M.B.,

Late Medical Officer, Nashipur Raj, Bhanga, District Faridpur.

MRS. R., a Mahomedan female, aged 44 years, multipara, suffered from slight fever for two days. On the 8th November, 1930, she was found unable to speak or swallow anything. After an hour she got a severe rigor and vomiting, and the temperature rose to 104°F. A sub-assistant surgeon in charge of the local charitable dispensary was called to attend the case. On arrival he found the abdomen tympanitic and the patient unable to answer his questions, though she understood everything, or to sip even a dose of medicine in teaspoonfuls. He at once gave a glycerine enema and injected 8 grains of quinine bihydrochloride intramuscularly. He left a phial of adrenaline chloride solution there instructing the relatives to drop 10 minims of it 2 or 3 times daily under the tongue. Next day he also injected 7 grains of quinine. In the afternoon the temperature came down to 98°F., but the patient was somewhat restless.

In the evening I was called in to consult about the case. On arrival I found the patient calm and quiet; temperature, 98°F.; pulse, 90; respiration, 20 per minute. On palpation I found the abdomen was a little tympanitic and painful on pressure; there was no history of round worms. She could show me her tongue. I examined carefully her mouth and pharynx but could find no cause for her condition. She showed me by her finger that she had been feeling pain in the chest just at the midsternum. There was nothing abnormal in the heart or lungs. There was no pain in the pharynx, but severe spasm came on in the act of deglutition when even a teaspoonful of fluid was poured into the mouth, and there was a feeling of choking. I found no apparent cause for her distressing symptoms. I advised the attending physician to inject 1/100 grain of atropine, to put a fomentation over the neck in front and to give adrenaline under the tongue. They called me again the next morning. I found the patient cheerful and by signs she tried to make me understand that she was otherwise well excepting the complaints of speech and deglutition; temperature 97°F. She wanted to take rice if she could. I advised the attending physician to give a glycerine enema and inject again 1/100 grain of atropine and to continue adrenaline and hot fomentation as before. I also suggested rectal feeding if she did not improve a little after a few hours. To my surprise I was informed in the evening that she could sip liquid in teaspoonfuls. Next morning she could swallow everything. Thereafter she made an uneventful recovery. The patient was not of a neurotic nature and had been leading an active life. Atropine seemed to have cured the condition whilst quinine cured the malaria.

In the January, 1928, issue of the *Indian Medical Gazette*, I read about a case of dysphagia as a complication of malaria, but in this case I found both dysphagia and aphonia combined.

A CASE OF VASOMOTOR DISTURBANCE AFTER AN ANTIMONY INJECTION.

By J. P. SINHA,

Medical Officer, Pirpainti Hospital, Bhagalpur.

A BOY of about 8 years old was under my treatment for kala-azar. His spleen was 3 inches below the costal arch. Three injections of urea-stibamine, of 0.025, 0.05 and 0.1 gramme, respectively, were given, two injections a week. On the day of fourth injection, when I gave him 0.1 gramme, suddenly he complained of severe abdominal pain and pressed his hand to his abdomen and after a couple of minutes he became unconscious; his breathing was very hard, pulse was very slow and almost imperceptible and saliva was coming out of his mouth profusely. I was very much alarmed at these symptoms of the patient. I immediately gave him 0.5 c.cms. of pituitrin subcutaneously. A minute or two after the injection he passed a semisolid motion and then he began to improve in his condition. His pulse improved, respiration came to normal, and consciousness revived.

[*Note.*—Such cases are not at all uncommon. We collected notes on cases in which there was a similar reaction, and reported and summarised them in our issue of November, 1926. The treatment we suggested was adrenalin subcutaneously. We have used both adrenalin and pituitrin, but in most instances the condition is only transitory and the symptoms pass off without any treatment. They are, however, so alarming that the doctor feels compelled to take some action.—EDITOR, *I. M. G.*]

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Dangerous and Fraudulent Imitations.

Read this carefully. *Times of India.*

SKILFUL IMITATION OF PRODUCTS.

FRAUD ON CHEMICAL FIRMS.

Special to "Times of India."

PARIS (By Mail).

So cleverly did a gang of fraudulent patent medicine vendors make up and sell quantities of faked medicines to chemists in Paris and elsewhere in France that the proprietors of the patent medicines themselves when asked by the police were unable to distinguish their own products from the faked ones.

The bottles, labels, printing and wrappings were all exactly imitated. Large shipments were made to Cuba and Mexico by deluded purchasers of the counterfeit medicines. Several arrests have been made but the police do not yet believe that they have caught all the men involved in the fraud which has cost reputable houses many thousands of pounds.

One of the cheated chemists with the connivance of the police set up a temporary export bureau and gave an order to the suspected persons. They duly delivered the falsified goods only to find themselves on arrival in the hands of the police. —British United Press.

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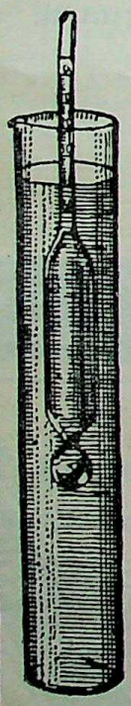

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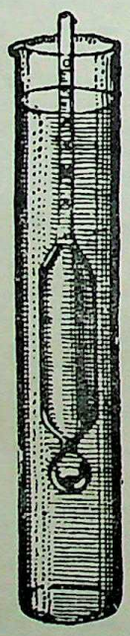

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Indian Medical Gazette.

FEBRUARY.

THE REPORT OF THE MALARIA COMMISSION OF THE LEAGUE OF NATIONS ON THEIR INDIAN TOUR, 1929.*

WE are afraid that our readers will accuse us of paying too much attention to the subject of malaria, but the publication of this long-awaited report is an event of first importance in the history of malariology in this country. It is "ourselves as others see us."

This being so, we confess frankly that we are profoundly disappointed with the report. The Commission—consisting of six experts from Europe—were for more than four months in India during the malaria season. They visited the most intensely infected tracts of India,—not indeed without risk to themselves, as was shown by the fact that one of the party developed a severe attack of malaria in Burma. Everyone who met or toured with the Commission was struck by their thoroughly business-like attitude; they were not out on a joy ride, but to get down into local conditions, to hunt streams and swamps for larvæ, to palpate spleens. The Imperial Government and every provincial Government did their utmost to place all the information available at their disposal; the different railways of India toured them in special trains. The four months' study of the Indian problem enabled them to see the various aspects of malaria throughout the Indian Empire as no worker within it has ever done before; throughout the whole of their tour they were accompanied, from point to point, by every local expert engaged on malaria work, and were literally snowed under by collections of documents, previously published or specially prepared for their information that could in any way facilitate their obtaining as complete a knowledge as possible of their subject. In addition, the local malariologists who accompanied them lived under a continuous fire of questions,—as one of them graphically expressed it, it resembled a non-stop *viva voce* examination!

Bearing this in mind, the result can only be described as disappointing. The present report will not bear comparison with the previous and admirable report by the same Commission on malaria in Palestine. There is little or nothing in the report of a comprehensive grasp of the huge problem of Indian malaria, no envisagement of general lines of policy to be followed; but much detailed criticism. Whether the Commissioners were hurried in writing their report, we do not know. But we had expected a report more in the nature of the *Final Report of the League's Commission on Human Trypanosomiasis*, a document of 392 pages. *Vis-à-vis* the latter, the Malaria Commission have issued no more than an introductory chapter.

The document consists in all of 77 pages. Of these 12 are devoted to contents, itinerary, etc.; and 16 more to a note (originally given as an address to the Commission) by Col. Christophers, I.M.S., on "Malaria Research and Prevention in India"; leaving only 49 pages for the actual report itself. Brief as it is however, its lessons must be studied.

The first clear criticism of anti-malaria measures encountered is in connection with the dispensing of quinine, when the existing organization is definitely pronounced "insufficient," and it is clear that the extra organization to the standard one put forward by certain Provinces equally failed to convince the Commission that efficiency was attained, but no suggestions are made as to how such efficiency can be achieved.

The second half of the report is devoted to what the Commission saw,—which led them to divide the Indian problem as a whole into four chief heads:—

(*a*) The urban malaria problem.
(*b*) The Punjab problem.
(*c*) The Bengal delta problem.
(*d*) The hill malaria problem.

Though far too briefly dismissed, the Commission does in fact have something, be it only one or two sentences, weighty to say on each of these:—

(*a*) *Urban Malaria.*—This, they state, rightly, is not really a problem at all, as it has been cleared up mainly by the work of Bentley and Covell in Bombay. All four authorities in that city come in for some hard remarks, the Bombay Municipality being adversely compared to "other politically less advanced and more simply governed cities, like Bangalore."

It is, in fact, simply ridiculous that the Gateway of India should remain malarious, where a few months intensive work, adequately continued, would render it completely free. The chief offender accused is, of course, the municipal system of city government, and we imagine that the port and railway authorities are tired of trying to set an example, and of wasting money on improving their own areas dovetailed into municipal land.

(*b*) *Punjab.*—The problem of malaria in this province is briefly but ably set forth. Attention is drawn, for the first time, to the probable existence of "permanent foci," whence the terrible epidemics of this province take their rise. Rightly it is stated that this is a matter

* League of Nations, Health Organisation, Malaria Commission. *Report of the Malaria Commission on its Study Tour of India.* (August 23rd to December 28th, 1929.) Pp. 77, No. C.H.|Malaria|147. Geneva, August, 1930. Price not stated.

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which requires much more investigation. The views of the Director of Public Health of the province on malarial ætiology are very fairly represented, and the pros and cons of the various aspects of the problem are enunciated. The whole problem wants much further investigation, and the Malaria Survey of India appears to be rightly devoting most of their time to it.

(c) *The Bengal Delta.*—The Commission are in agreement with the Director of Public Health over the factors of causation here. This being so, they think it is up to Government to consider Dr. Bentley's hypothesis confirmed, and to act on it, at least over an area sufficiently large to afford a fair experiment. No consideration of financial or legislative difficulties should be allowed to stand in the way. The bunded tanks referred to are, in themselves, a minor problem that will yield to the usual anti-larval measures. They could be kept clear edged and harmless by legislation alone.

(d) *The "Terai and Hill" malaria problem.*—Here we see the Commission completely beaten, unable to suggest any measures of general applicability. These areas, except in so far as they are the scene of industrial enterprises controlling malaria by measures too costly for general application to indigenous agriculture, must await that oft-quoted millennium when "biological control" is a reality. In other words the remedy is research, and yet more research, into basic problems of Anopheline ecology.

Having thus summarized the chief problems, the Commission pass to actual examples of malaria control they encountered in their tour. This is the largest chapter in the report, and in it those now engaged in practical anti-malaria operations in India will learn what the Commission thinks of their efforts.

In the first place, the criticism that anti-anopheline measures are confined to anti-larval measures only is well made, but it is hopeless to draw inferences from tea garden coolies under discipline to the generality of the inhabitants of the sub-continent. Races which, even in their higher walks of life, will tolerate the infection of their dwellings and persons by hæmatophaga far more loathsome than mosquitoes are not likely to spend any effort in dealing with the latter.

A valuable set of observations are included here on oil *versus* Paris green. It is not only the human factor that precludes the more general use of the latter in India, but the fact that in rainy weather its utility is so largely curtailed, that makes oil the larvicide of choice in this country, where the wet season, unlike Europe, coincides with the maximum breeding period. But, *pace* the Commission, it is no exaggeration to say that "every coolie in India requires a man to supervise him, and that the supervisor has to be watched by someone else." It is a hard, cold truth that hampers all efforts at efficiency throughout the sub-continent.

From this the Commission passes to individual examples of control.

Tea gardens.—The excellent results of Ramsay in Cachar are worthily paid full tribute to. This is certainly the most scientific control in India. The discordant results in the Duars are referred to. We suggest that this might disappear if the Meenglas control was under the residential supervision of a worker of the "drive" of Dr. Ramsay.

Railways.—Descriptions of controls both on the open line and during construction are given, and the Commission appear satisfied that the considerable sums expended are justified.

Mines.—The expenditure is shown to be on the same scale as in railway work.

Port construction.—The work carried out at Vizagapatam is in question, and again meets with the unqualified approval of the Commission, but as in the case of Bombay, they show how the results of local self-government are stultifying all the efforts of other authorities. One can only hope that the ears of the Chairmen of the Municipality and District Board are burning as a result of the strictures passed upon their corporations by the Commission, and that Government will find courage to follow the lead of the Government of Mysore, quoted with approbation by the Commission, and remove to the Public Health Department all sanitary powers at present vested in these bodies.

Irrigation works.—The Sarda Canal headworks in the United Provinces and the Metur dam in Madras were visited. The latter earned their approval.

Lahore cantonments (Mian Mir).—The Commission examined this so-called failure of control by anti-larval methods, and failed to understand it. Too much ink has been wasted over this experiment to say more than that the only way of stopping the discussion and settling the problem is to do it all over again under expert but unbiased supervision.

Cities and towns.—Delhi and Saharanpur are quoted as examples of what can be done at a reasonable cost per head. Bangalore is held up as a model to all the other cities of India. A further opportunity is taken at this point to trounce those responsible for the deplorable condition of Bombay.

Rural areas.—The Commission remain unconvinced of the efficiency of what they were shown in the Northern Shan States. These were the sole examples that the Indian Empire could show them of any attempt to control malaria as it exists in 90 per cent. of the malarious areas of India, areas which are neither towns nor the locations of industrial enterprises. At Ennur in Madras they were shown a situation crying out for Government interference, easy of scientific control, where nothing was being done.

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Popular efforts.—Only Bengal can show any real effort in this direction, effort, that is, semi-independent of Government. Of these Anti-Malarial Co-operative Societies only one, which has worked under the guidance of the Public Health Department, comes in for genuine approval. The annual report of this society has been reviewed on at least one occasion in our columns. But this society cannot be said to be independent of Government, as over one-third of its expenditure is provided by the latter. Let us hope that the numerous other societies will not be too proud to learn from the Public Health Department.

Summarizing this chapter, the commission points out that the section describing controls in agricultural, industrial and military centres, brief though it is, represents the bulk of the chapter. As they state "....Malaria control in India is practically limited to selected groups of the population whose health....is particularly valuable and particularly threatened by malaria." This means that it is only the industrial concerns that are sufficiently long-sighted financially to undertake anti-malaria work on behalf of their employés, though no one can doubt that there are numerous towns, at least, where malaria control would directly benefit the citizens financially. Equally unfortunately, it also means that any method of malaria control applicable to the average agricutural village community is still to seek.

An extremely important *pronunciamiento* in this summary is that, for India, the Commission is generally converted to the practical efficiency of the half-a-mile control radius. It is only another instance of the fact that there is no standard rule in anti-malaria operations. What would be certainly insufficient for Europe is found to work in India. The conversion of the Commission is handsomely admitted in a footnote on page 70.

In the final chapter full tribute is made to the quality of the research work carried on in India. The problems that are being, or should be, studied in full detail they set forth as under:—

(*i*) Discovery of the best method of treating the disease.

(*ii*) The most suitable way of distributing quinine in rural areas.

(*iii*) The testing of the different known methods of anti-larval control.

(*iv*) Special investigations into flight range.

(*v*) The relationship of malaria epidemics to economic conditions.

(*vi*) The elucidation of the "endemic foci" of the Punjab.

(*vii*) The whole question of the relationship of blackwater fever to malaria.

(*viii*) The complete acquired immunity of aboriginal tribes in hyper-endemic areas.

(*ix*) Anophelism *sine* malaria in Bengal.

In a short chapter of conclusions, the revolutionary suggestion is made that all rural medical assistance should be transferred to the Public Health Department, leaving only large hospitals to the Medical Department. As the Commission states, this would give the Public Health Department a far stronger hold on the population.

Finally, in a report which is by no means free of allusions to the effects of transferred subjects and local self-government, the Commission close by some thought-compelling paragraphs on this matter, again reverting to the warning lesson of Bombay. All would-be reformers should study these paragraphs.

NOISE.

Noise, excessive noise, has been looked upon hitherto as one of the necessary accompaniments of progress; the racing car, the aeroplane, the roadmaker's electric drill and the builder's pneumatic rivetting hammer fulfil their diverse functions in the most efficient possible manner, but to a visitor from the Stone Age they would probably appear simply as elaborate devices for making a very loud noise. Complaints against noise are as old as history, and we have not the slightest doubt that the prehistoric child had his head slapped for rattling mammoth's bones when his father was trying to sleep, but they have been confined almost entirely to complaints against noise during the recognized sleeping hours. Complaints against noise during the day time have only come from the sick, and when an apparently healthy man in the street raised his voice (as he would have to do in order to be heard!) he was classed as a neurasthenic. It is now gradually dawning upon the world in general and the medical profession in particular, firstly, that many of the noises which we have endured without complaint are entirely unnecessary, that much of that which on the surface appears to be inevitable can be obviated or at least abated by the exercise of a little thought, and that in the future man's inventiveness, which has apparently up to the present been exercised solely in the direction of making noise, might with a little encouragement, or if necessary stimulation, be turned towards the absorbing or muffling of noise; secondly, that not only does noise make the sick man sicker and drive the neurasthenic into the comparative quiet of the lunatic asylum, but that it alone may be responsible for producing sickness in the sound body and neurasthenia in the sound mind; and, finally, that unless something is done about it the position will become steadily worse.

Before any attempt is made to remedy an evil of this nature there are two points which have to be settled; firstly, whether the evil really is an evil, and, secondly, how it can be measured, so that any improvement which may be brought about can be recognized. In this particular case it has to be determined by

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experiment that noise actually has a detrimental effect on the healthy human being, and a means by which noise can be measured has to be devised.

When the typewriter was first introduced we feel sure that the makers kept a discreet silence on the subject of noise and its effect on the other workers in an office. It was probably left to the very conservative head of the firm to point out to the progressive youngest partner that, not only would the noise of this new-fangled machine drive him to distraction, but it would interfere seriously with the work of all the clerks in the office who were at that time not using the machine. Since the younger generation has got its own way and since even in the smallest business establishment the typewriter is looked upon as essential office equipment, these same typewriter manufacturers, or their successors, have seen the necessity for producing 'noiseless' machines and are now vociferous in their concern regarding the detrimental effect of noise on the efficiency of the office worker. Experiments have been carried out which show that the output of a group of office workers can be raised as much as 10 per cent. by a comparatively small reduction in the noise in the office, and a telegraphic company has shown that by the same means errors can be reduced by 40 per cent. These figures must appeal to the managers of business concerns, but most of the experiments reported have been applied to mental rather than to physical workers. A certain degree of concentration is required even for the copying of a letter, and it is inconceivable that this could not be done more efficiently in a quiet office than in a noisy one. Therefore, although the experiments provide a very sound commercial reason for the reduction of noise, the figures produced are not quite what the guardians of the public health require. They would like to divide the staff of a large office into two equal—from the point of view of mental capacity as well as members—parts, one half to work in a noisy office, the other in a quiet one, for a period of twelve months, and then to test the efficiency of each set of workers. They would also like to see an experiment carried out with manual labourers, to see, for example, if the bricklayer would lay more bricks in or out of the vicinity of a pneumatic rivetting hammer. However, experiments have been carried out by medical men which show the actual physical effect of noise on the human organism; it has been shown that noise will raise the blood pressure, increase the rapidity of the heart beat, increase the intracranial tension as much as four times, and increase the basal metabolic rate. It has been shown that these are not indirect effects secondary to emotion, but that emotion itself is only a secondary effect. It has been shown for example that by means of noise the blood pressure of a sleeping man can be raised almost to the waking level without actually waking the sleeper. The evidence as to the detrimental effect of noise thus appears to be fairly complete.

In describing the intensity of noise we have had to depend entirely on adjectives. The fact that the words 'deafening' and 'ear-splitting' were used does suggest that even the layman suspected that excessive noise did his organ of hearing no particular good; with the advance in our knowledge we shall have to add 'atheroma-producing' and 'heart-dilating' to our list of suitable epithets. As a means of expressing one's emotions adjectives are much more valuable than cold figures, and we do not feel that the remark 'desist from making that fifty-decibel sound' would have the same effect in stopping the noisy chatter of one's servants as our usual 'Stop that — row.' But where comparisons have to be made it is essential that noises should be measured accurately and be given numerical values. The instruments which have been devised for measuring noise are of two kinds: one consists of an instrument for making sound of variable but known intensity; the operator listening to this sound through a slotted ear-piece first lowers the intensity until it is quite inaudible and then increases it until it is just audible above the noise to be measured. As the intensity of the sound made by the instrument is known, it is possible to give the noise which is being measured a numerical value. It is quite obvious that any instrument which involves the human element has its disadvantages and that until some satisfactory entirely mechanical instrument is devised, the measurements of sound will be only approximate. To achieve this a number of instruments have been designed; the principle on which they work is the measurement of currents set up by the vibrations of the drum of a microphone supplemented by another instrument which measures the sound intensity for different bands of frequencies. It is probable that we have a long way to go before anything like perfection in these instruments is reached.

The unit of sound which is usually employed is the decibel; the noise produced by blasting or rivetting is about 100 decibels, or 10,000,000,000 times as intense as the smallest sound that the human ear can appreciate. Other sounds which have been measured in New York City are the steamship whistle, which registers 95 decibels, an underground express train passing a station which produces a sound of the same intensity, a steam-operated pile-driver which makes a 90-decibel noise, a tramcar passing over a crossing which produces 75 decibels, and normal street traffic which produces a 60-decibel noise. It is interesting to compare these with the roaring of a lion which measures 80 decibels and that of a Bengal tiger which is said only to register 70. (We have taken these figures from an American

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paper and we hope that the writer was not attempting to belittle India's potentialities!) The intensity of a sound must be in proportion to the distance of the listener from its source. An ordinary conversation between two persons measured at three feet is about 60 decibels, which means to say that at this distance it would be drowned by the noise of the normal street traffic.

In the matter of noise control New York has taken the lead and the New York Noise Abatement Commission has been formed; it is from the reports of this commission that most of the figures which we quote above have been taken. Other big cities in both America and Europe will probably soon follow this lead, but in the meanwhile it may be found possible to take advantage of the findings and recommendations of this commission. The control of noise is certainly a matter to which the health officer should turn his attention. Although it is not a subject that he can exactly take up in his spare time, it is from him that the suggestion for the organization of a proper department for the abatement of this nuisance should come.

In India, as is usually the case, the problem is a slightly different one. Noise-producing machinery has not yet established itself so firmly in our cities as is the case in the large cities of the West. In Calcutta tall buildings do not mount skywards in silence, but the noise which disturbs the neighbouring residents is more frequently the shouting of the coolies as they pull on the ropes which operate the pile-driving apparatus than the rat-tat-tat of the pneumatic rivetting hammer, and it is not the continuous roar of the street traffic which is so distressing but the honk-honk of the roving taxi looking for a fare. But the time will come when all the noise problems which are now being considered in London and New York will have to be considered in the large towns in India. Palatial office buildings are continually rising in Clive Street and here the most modern—and noisiest—methods are employed. The adjacent office worker should try to keep his memory fresh, so that when in turn his office is rebuilt he will insist that arc-welding replaces the pneumatic rivetting hammer. Our street traffic to-day is far from silent, but when the water-buffalo carts are replaced one day—which for the sake of that wretched 'amphibian,' who is made to drag huge loads through the burning midday heat of Calcutta's hot weather, we earnestly hope will not be far hence—by motor lorries and these have all become dilapidated, unless some corresponding advance is made in road surfaces, the Strand Road, for example, will not be a good place to undergo a rest cure.

Except that the police insist that the electric horn, which in most instances produces a comparatively inoffensive noise, shall not be sounded in certain streets and the Automobile Association of Bengal puts up notices—usually in a language not known to 90 per cent. of motor drivers—outside hospitals asking for "silence", at present in India the control of noise is nobody's business. We would not suggest that the time has come to form a noise-abatement commission or even to employ a whole time officer, nor do we think that the hard-worked health officer should be asked to divert his attention from his present important duties, but the time is not inopportune for some public spirited individual, either the head of some large engineering firm, or some official, such as the chairman of the Calcutta Improvement Trust, to give the matter his attention, even if he does nothing more than examine the reports of the noise-abatement commissions of New York or of any other similar body which may be formed, and estimate how far their findings might be applicable to conditions in India. Admittedly the need for some action is not as acute in any Indian city as it is in London and New York, but this should make it easier to deal with the problem; prevention is better than cure.

Excessive noise, as well as being objectionable for other reasons, is definitely detrimental to the human organism. Most noise is directly human in origin, and is preventable; it is, therefore, the duty of every medical man, in India particularly where unnecessary noise is nearly always due to thoughtlessness, to do his utmost to awaken a noise consciousness in dwellers in this land.

L. E. N.

Special Article.

GYNÆCOLOGICAL PROGRESS.

A POST-GRADUATE CLINICAL LECTURE.

By V. B. GREEN-ARMYTAGE, M.D.,
F.R.C.P. (Lond.), F.C.O.G.,
LIEUTENANT-COLONEL, I.M.S.,
Professor of Midwifery and Gynæcology, Calcutta Medical College, and Surgeon to the Eden Hospital for Women, Calcutta.

Habitual abortion.

I DO not wish to speak of criminal abortion, for that, as you are aware, is an extremely frequent occurrence in the tropics, all manner of means and method being used by that confirmed optimist, woman, in her endeavour to relieve herself; but rather this morning to discuss the subject of habitual abortion, which as you know is a constant source of *chagrin* to both doctor and patient. Oft-times the cause is easy to discover for you will remember the old mnemonic "T. U. T. O." which stands for (1) toxæmia, (2) conditions of the uterus, (3) trauma, and (4) conditions of the ovary, including endocrine dysfunction, but there is another class of case which repeatedly will defeat you. I refer to those women apparently

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perfectly healthy and with normal serum reactions, who constantly abort despite all investigation and treatment of both husband and wife. This type of case is seen more frequently in private than in hospital practice.

It is no uncommon thing for such patients to be considered syphilitic, but I am sure that that idea is a wrong one; for during the last few years this point has been investigated for me by the Imperial Serologist, Col. Lloyd, and in less than 20 per cent. of these repeated miscarriages has he demonstrated a positive Wassermann reaction. Moreover, I have repeatedly seen cases of primary and secondary syphilis during pregnancy who have not aborted. It would seem therefore that the most reasonable explanation of such cases of abortion is either lack of vitality, or incompatibility of the germ cells—a condition of affairs which has been amply demonstrated in domestic animals by Professor Arthur Robinson.

On the other hand, the fascinating recent work on the female sex hormones would seem to offer an explanation and, what is more important, a line of treatment for these repeated abortions.

We have long known that pre-menstrual congestion of the uterine mucous membrane was due to a hormone elaborated first in the Graafian follicle and stroma cells of the ovary called œstrin, and that should the egg cell die or the Graafian follicle be injured or diseased this pre-menstrual endometrium necroses and comes away as a menstrual decidua; but the recent work of Teale, Parke, and others shows that, after the ovum leaves the Graafian follicle and the corpus luteum is formed, the lutein tissue itself forms a hormone which at present is called the beta-hormone and that it is this beta-hormone which is responsible for the embedding of the fertilized ovum in the uterus.

The romance of this mechanism is still further enhanced by the fact that it has been proved indirectly by the Zondek Aschnim test that this beta-hormone depends upon the healthy activity of the anterior pituitary gland.

The question now arises as to what stimulates the anterior pituitary to do this; the answer is that when the fertilized ovum imbeds in the uterus, a direct chemical messenger is sent from the trophoblast to the anterior pituitary to perform its part of the cycle—the beta-hormone being thus continuously manufactured for the maintenance of the ovum *in utero* until full term.

Now, for many years we have known that the anterior pituitary controlled skeletal growth and, especially, maturation of the generative organs, nor need I remind you of such pathological entities as gigantism, acromegaly and Frohlich's syndrome, but to-day we know that there is another anterior pituitary hormone which stimulates the ovary to produce a chemical substance which determines maturation and fixation of the impregnated ovum. The presence of this chemical substance in the blood after impregnation can be demonstrated, and Dr. M. Gupta, our pathologist, has frequently demonstrated it for us in immature mice by the Zondek Ascheim test in cases of possible ectopic gestation, etc.

If you understand what I have said above I think you will realize that many patches hitherto dark in the pathology of the living, are now illuminated. For instance, why does habitual abortion or premature delivery occur in an apparently healthy woman? Obviously the answer is that the chemical messenger from the trophoblast to the anterior pituitary ceases with the result that the beta-hormone is cut off and maturation terminates. Similarly, you will understand that if there is local or remote affection of the corpus luteum, for instance, hæmorrhage, nerve shock, tumour or trauma of the ovary, the cycle of supply will be disorganized and abortion occur. In the same way termination of pregnancy at full term is probably due to degenerative changes in the trophoblast which result in a "cut off" of the requisite stimulus to the pituitary.

Finally the decidual cast of the uterus which occurs on the death of the ovum in an extra-uterine pregnancy and probably the condition known as hydatidiform mole illustrate a "cut off" of the pituitary or beta-hormone.

All this may sound rather difficult and you may be asking yourselves what connection there is between this pathology of the living and the treatment and prevention of abortion; and, the answer is that we should assist Nature to maintain the health of the ovum and decidua. How can this be done?

Ever since the work of Blair Bell it has been known that the secretion of the uterine glands is normally rich in calcium and iodine, and that in the decidua, both of menstruation and of pregnancy, there is a marked retention of these substances in the large glands of the stratum spongiosum, retained there by nature for the purpose of the ovum. Using this information, stock-raisers and poultry-farmers have discovered that if iodine was added to the food of pigs and poultry, that the fertility rate of these animals was raised by 50 per cent. Therefore it is probable, as Professor Beckwith Whitehouse states that "the iodine content of the uterine secretion in the human female has a similar significance, for just as inorganic toxic agents, for example lead, are transmitted to the ovum and act deleteriously upon the syncytium, so it is possible that other agents such as calcium and iodine are similarly transmitted to act beneficially!" Therefore we should prescribe a full calcium diet and iodine by the mouth in the form of either Collosol aqueous iodine, or 5 drops of French iodine in milk twice a day or syrup ferri iodide.

In the matter of diet there has been some most interesting work done recently by Scott and Evans upon the existence of an anti-sterility

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vitamine, namely, fat-soluble E. These authors and their co-workers have shown if this vitamine is withheld from the diet of a female animal it remains sterile, and if denied to a normal pregnant animal it aborts; whereas if it is given to a barren animal fertilization will occur. Vitamine E, as one would expect from its vast importance to humanity, has great powers of resistance and is not destroyed by heat, or desiccation at a temperature of 100 degrees centigrade. It is found especially in wheat germ, lettuces, peas and the yolk of egg, and the most remarkable fact about it is that it closely resembles, in chemical and physical reactions, vitamine A and the beta-hormone of the ovary. These facts, as you will see, open up a romantic field for speculation; for, if you have understood the influence of the beta-hormone upon the growth of the decidua, you will at once grasp the importance of the fact that these hormones and vitamine E are of similar composition; for, as Whitehouse puts it "does the ovary not only provide the ovum, but also the essential growth factor upon which the future development of the embryo depends."

The corollary of this bio-chemical research suggests, therefore, that the additional proper treatment of a healthy woman who frequently aborts, should be dietetic, that is her food should contain vitamine E and vitamine A containing substances.

Sterility.

I will not burden you further with the importance of diet in the case of sterility or in those cases of menstrual abortion; by this I mean that type of case so frequently seen where a woman will tell you that six or seven times she has been almost certain that she has become pregnant because her periods, usually perfectly regular, have been delayed from two to fifteen days. For these are really cases of a vicious circle, by that I mean ill-health or microscopic disease of ovary and uterine mucous membrane, leading to repeated shedding of the decidua, and as such, should be treated surgically, dietetically and medically.

However, provided there is no congenital developmental error in the woman or fault in the husband, there is a general idea that all cases of sterility are due to displacement of the uterus, but bear in mind that 25 per cent. of all women at puberty have a retroverted uterus and 15 out of these 25 conceive without difficulty, although of course they may have symptoms and even abort, due to such displacement, if it is not rectified. In the remaining 10 there may be some mechanical kink in the tubes which can be demonstrated by Rubin's test and will require surgical intervention, such as Gilliam's operation, if the test is only positive when the uterus is anteverted.

I will not detain you by recording the pregnancy results of the modified Gilliam's operation; for hardly a week goes by that you cannot see one of these patients in the maternity wards, but I think it is of importance to remind you that Rubin's test alone, if positive, has a therapeutic value of over 10 per cent. in cases of sterility, and that the lipiodol test which I have so frequently shown you has a therapeutic result of at least 30 per cent. This test is very easy and is one which you should be thoroughly familiar with, for a patient has every right to expect you to know how she may perhaps obtain her heart's desire.

It may be of interest to inform you that in eight recent cases of mine, where the test was positive, three have become pregnant. In two others the test was negative due to an obvious block at the fimbriated ends of the tubes. Salpingostomy has been performed but conception has as yet not occurred, although the tubes were patent one month after operation.

During the last year Rubin and Miles Phillips have both recorded cases of sterility, associated with ovarian dysfunction and amenorrhœa. In such cases, Rubin first suggested 1/10th of an erythema dose of *x*-rays to both ovaries for three successive months. This stimulatory dose to the ovary and its hormones has been mildly successful, both authors reporting normal pregnancies and healthy children as a result. At my request Dr. Galstaun applied *x*-rays to a patient with two years' complete amenorrhœa, who had had every known treatment hitherto. The result was a flooding, ten days after the first treatment which, I consider, cannot be other than due to the effect of the rays upon the ovary. All gynæcologists are continually being bombarded with such cases and you all know the mental distress associated with this condition. Therefore if your radiologist is of good repute it is well to know that the periods may return in over 50 per cent. of cases and even pregnancy occur.

Leucorrhœa.

The "white flux" is a condition particularly common in the tropics and one of no ending embarrassment to general practitioners; for, in India, proper examination is rarely permitted. Leucorrhœa occurs almost as frequently in the virgin as in the married woman, therefore perhaps it will be wisest to deal with the former class first, for they are a frequent source of anxiety to parents and school-mistresses. The first thing which you must rid your mind of is venereal contamination, for except in cases of obvious vulvo-vaginitis, the class of case that I am referring to, is that in which there is no local external disease whatever,—merely a constant creamy white discharge which stains the underwear.

It used to be thought that the virgin vagina was guarded by the *Bacillus vaginæ* of Doderlein, but my pathologist, Dr. Gupta, finds in smears and cultures that this bacillus of

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Doderlein is frequently absent, its place being taken by streptococci or *B. coli*, fungi, protozoa, trichomonas or even the ova of worms in the majority of cases of virginal leucorrhœa. In some instances where palliative treatment has not succeeded, I have dilated the cervix under chloroform and taken smears and cultures from the cervical canal, for the glands being infected have kept up the discharge.

Occasionally masturbation, with secondary pelvic congestion and infection may be a cause. In others ill-health or prolonged menstruation would appear to be pre-disposing features, but I have never seen tuberculosis doing this in an unmarried girl. Treatment without the help of a bacteriologist is empirical. My own procedure is, first to procure a swab for smear and culture report from the upper, middle and lower portions of the vagina by means of a thin rubber topped hollow glass cylinder passed through the hymen. Scores of times I have tried vaccine treatment, autogenous and otherwise, but I am afraid I can say no good word for it in these cases. Local treatment in the form of douches, with a soft catheter are sometimes beneficial using 1 per cent. lactic acid or 1 per cent. synol soap or 1 in 2000 acriflavine, and following the prescription of Davis of Milwaukee, in cases of fungi and protozoa I have ordered 1 in 4 lugol solution as an instillation.

In inveterate cases, at the time of taking a swab from the cervix under chloroform, I have dilated the cervix and used the cylindrical terminal of an electro-cautery. This is pushed as far as the internal os and the current turned on. The radiant heat apparently kills local organisms, but care should be taken to apply it for only a few moments lest cicatrization occurs.

I need not speak of hygienic measures, such as attention to diet, exercise, cleanliness and moral platitudes, but I should like you to bear in mind what I spoke to you of last year in this connection and, that is, whenever you have any direct evidence of infection and that infection is due to a lowered resistance, remember that you should give, on the lines of Professor Mellanby, one teaspoonful doses of Radiostoleum twice a day for six weeks at least. Radiostoleum is vitamines A and D combined. For the last 18 months I have been using this anti-infective vitamine preparation and I am quite sure, it is of great assistance in these cases.

In married women the problem of treatment is by no means difficult for in most cases there is a history of labour or miscarriage with possible laceration or infection of the cervix and uterus. In other cases there may be old tubo-ovarian disease with localized peritonitis. Very occasionally constitutional disease or localized tuberculosis may give the clue.

In elderly patients you may find a salmon red vagina which looks like the throat in granular pharyngitis. Some of these cases are due to ovarian dysfunction, others are infected from a senile uterus or are trophic.

Ovarian tumours.

Neoplasms of the ovary are extraordinarily common in all tropical countries, but probably in no civilised country to-day are tumours of the ovary of such colossal size seen as they are in India. The tragedy of such enormous growths is that as a result of delay in seeking advice, secondary malignant changes occur.

Recently, with the help of Dr. K. Dutta, my registrar, I have analysed my personal experiences of 547 cases of ovarian tumours, and have discovered that, whereas the incidence of malignancy of such tumours in Europe is, according to Doderlein, 10 per cent. and Lippert, 15 per cent., with us malignant chances occur in 21.7 per cent. This is a very regrettable fact and should make you fully understand that under no circumstances should procrastination be countenanced once a diagnosis of ovarian tumour has been made. Moreover, apart from the question of malignancy, an operation with a negligible mortality in Europe becomes a serious matter in India when the patient is cachetic as a result of carrying an enormous tumour for months and may be years. My mortality in a consecutive series of 342 benign ovarian cases was 2.9 per cent. The mortality in 95 malignant tumours was 24.2 per cent, the death rate in 100 broad ligament cysts being 7.2 per cent. The technique employed I can show you any week of the year if you will attend the hospital and this will be published in a later paper. There is just one practical point, however, I might mention, and that is, you should suspect malignancy if there is tenderness, fixation and pain in the tumour, together with a low degree of fever and ascites.

Prolapse.

The frequency of this condition compels me to remind you that it is curable, yet hosts of women suffering from prolapse are still unfortunately treated with pessaries; for what you do not realize is that although a woman may fear operation and be comfortable with a mechanical support in the early stages of the condition, the time will arrive before or after the menopause when as a result of the progressive atrophy of the pelvic muscles, a pessary will be useless and unendurable. The only cure is operative, that is, repair of the hernia through the muscle and fibrous tissue of the pelvic floor.

During the last 20 years I have watched the vogue of many operations and I think I have tentatively "tried out" all the many procedures advocated. The result has been a gradual crystallization of surgical technique for India which can be briefly stated as follows:—(1) for young women desirous of more children I perform the Manchester operation, and (2) for

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older women and those not desiring more children, I perform the interposition operation of Watkins with or without amputation of the cervix and posterior colporraphy.

My reason for dividing cases into two groups is that my own experience, and what I have seen of other surgeons' cases, is, that in the tropics old people do not stand the Manchester operation well. Frequently this operation takes over an hour and there is much shock and hæmorrhage; moreover sloughing, sepsis, infection of the bladder and secondary hæmorrhage are by no means uncommon, therefore I am in favour of the interposition operation which can be done rapidly and without shock or bleeding in old patients. One of the advantages of the interposition operation is that it can be done in a young woman who has had 2 or 3 children and does not desire more in these days of financial stress. This operation can be done in less than half an hour with ease, in a private house, or hospital and both tubes can be ligated at the same time.

Finally may I remind you that the proper treatment of prolapse is not ventrofixation of the uterus. I say this, for great experience of correcting examination papers from all over India convinces me that this erroneous idea still exists, though I trust the practice has died out. I feel sure that if this conception could be eradicated from the minds of practitioners many more patients would come to hospital for the modern simple and salutary operations which are based upon the anatomical and surgical principles of treating a hernia.

Tropical affections of the vulva.

Rid your head of the idea that most affections of the genitalia are of venereal origin; for in your practice you will frequently be consulted about many distressing conditions of the vulva which have no relationship to gonorrhœa or syphilis. For instance, the genitalia are frequently the site of drug rashes and I have seen eruptions there, following quinine, potassium iodide, Veramon and phenolphthalein. Again simple eczema is a very common condition in the tropics especially in obese subjects. Oftentimes the surfaces weep or you will see yellowish-brown greasy looking scales. You will of course think of diabetes but in my experience sugar in the urine is rarely found in these cases. Try therefore to eliminate any septic condition in the vagina or bowel, such as, hæmorrhoids, dysentery, or mycotic and epizootic infections. And remember, that despite all treatment and diet these cases are often intractable and relapse after apparent cure.

Pruritus ani is similarly one of the most devastating conditions. These patients when seen have usually had every known treatment and are suffering from secondary dermatitis as a result of scratching. When all ordinary treatments have been tried including looking for a cause in the rectum, stool and vagina, I think the best results are obtained by the injection of Benacol (Allen and Hanbury) around the anus subcutaneously.

Remember that the perineum and vulva area are particularly sensitive to x-rays. Therefore such treatment should be in the hands of an expert, lest secondary dermatitis or carcinoma occur as a result of the rays. One of the most distressing of all conditions is the ano-vulval pruritus, seen between the ages of 40 and 50, associated with atrophy of the epidermis and subcutaneous tissues, for a cure does not exist.

Non-venereal ulceration of the genitalia is not uncommon. I have seen yaws, leprosy, noma, and tuberculous ulcers all of which have been diagnosed as syphilitic, but the condition I want to emphasize most particularly as a source of error is granuloma inguinale which is very common in tropical countries. Its appearance is that of progressive ulceration of the labia and perineum. Its edges are slightly raised and the skin is œdematous around the exuberant fleshy granulation tissue. It is a terrible mistake to diagnose this condition as syphilitic in origin, for the treatment is exactly the same as that of kala-azar and is attended with equally good results.

Occasionally you will see a rodent ulcer or epithelioma which has been incorrectly diagnosed in the neighbourhood of the vestibule or labium. So beware !

In out-patient departments it is not an uncommon thing for patients with an elephantoid condition of one or both labia to present themselves.

Do not dismiss them all as syphilitic; for it may be caused by a streptococcal skin infection with a subsequent lymphatic block or be secondary to ulceration especially on one side of the vagina, e.g., tuberculous or malignant. In other cases it may be due to filariasis.

Finally, very occasionally you will see in young people such rare conditions as ulceration following diphtheria, typhoid, measles and kala-azar.

Herpes in the genital region though recorded must be very rare. I have never seen a case.

Vesico-vaginal fistula.

You will remember in a former lecture, I referred to the excellent work done by Colonel Fraser, I.M.S., on this subject, in which he implants each ureter at an interval of six weeks, into the rectum in those cases of otherwise inoperable fistulæ. The principle of the operation is the production of a true valvular mechanism as opposed to a sphincter. Following his technique, Major Gow, I.M.S., and myself have been equally successful. However, having followed the work of Gray Turner, Thompson Walker, and Coffey on transplantation of the ureters, it seemed to me possible to devise a simpler operation than that described in the *Medical Annual* 1930 whereby both ureters

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could be dealt with at the same operation, provided the general health and blood urea of the patient permitted it. The operation is not difficult and has been performed by me on four women, two of whom have survived, the two deaths being from uræmia at a later date and not from any surgical fault.

It would seem therefore that Colonel Fraser is correct in his estimation of the fact that the average Indian patient is unable to tolerate that degree of surface tension in the kidney which is readily tolerated by the European.

Gray Turner had four deaths in 19 cases, whereas Thompson Walker had 9 consecutive cases without mortality.

The operation as performed by me will be described and illustrated at a later date.

Medical News.

ALL-INDIA MEDICAL LICENTIATES' ASSOCIATION.

A MEETING of the Madras Branch of this Association was held on the 15th October, 1930, at which the following resolutions were passed:—

(1) This meeting of the licensed medical practitioners of Madras, while approving the formation of an All-India Medical Council, respectfully suggests to the Government of India that the proposed Council should be constituted on the same lines as the General Medical Council of Great Britain, including in its scope all registered medical practitioners in India.

(2) While appreciating the idea of attaching the Research Institute to any one of the University centres, this meeting is of opinion that in the matter of appointments and the granting of research scholarships, the claims of all the registered practitioners in India should be taken into consideration irrespective of the qualifications, whether they are graduates or persons holding British registerable qualifications or otherwise, basing the choice of the candidates solely on merit, special aptitude, previous training and experience in the line.

(3) This meeting authorises the Chairman, Dr. U. Rama Rao, to forward the copies of the above resolutions to the Government of India, Director-General of Indian Medical Services, the Minister of Public Health, Madras, the Home Member, Madras, the Surgeon-General with the Government of Madras, the President, Madras Medical Council, and the Press, both lay and Medical.

THE INDIAN HONOURS LIST. 1ST JANUARY, 1931.

THE following are the names of medical persons in the Indian Honours List of date 1st January, 1931. We would offer them our congratulations.

C.I.E.

Major E. E. Doyle, Inspector-General of Prisons, Bombay.

Lieutenant-Colonel J. R. J. Tyrrell, Chief Medical Officer in Central India.

Lieutenant-Colonel H. W. Acton, Director, School of Tropical Medicine, Calcutta.

Lieutenant-Colonel I. M. Macrae, Inspector-General of Prisons, Bihar and Orissa.

C.B.E.

Miss A. C. Scott, Women's Medical Service, Chief Medical Officer and Secretary, Dufferin Funds.

O.B.E.

Captain Hadji Kabiruddin Ahmed, Campbell Medical School, Bengal.

Lieutenant-Colonel J. W. McCoy, Civil Surgeon, Sylhet, Assam.

M.B.E.

Mr. H. Lyngdoh, Civil Surgeon, Nowgong, Assam.

KAISER-I-HIND (FIRST CLASS).

Dr. G. C. Ramsay of the Ross Institute, Assam.

KAISER-I-HIND (SECOND CLASS).

Miss Evelyn O'Sullivan, Indian Military Nursing Service, Matron, Indian Military Hospital, Quetta, Baluchistan.

Thotakal Krishna Menon Avargal, Honorary Physician, Government General Hospital, Madras.

Ralph Holmes, Assistant Surgeon and Quarantine Medical Officer, Bahrein, and Medical Officer-in-Charge of Victoria Memorial Hospital, Bahrein, Persian Gulf.

Yen Singh, Sub-Assistant Surgeon, Victoria Hospital, Darjeeling.

Miss Victoria Ellen Macarthur, American Presbyterian Mission, Medical Missionary-in-Charge of Zenana Hospital, Kolhapur.

Dr. William Alexander Noble, Salvation Army, Travancore.

KHAN BAHADUR.

Dr. Jamshed Byramji Mama, Director, Vaccine Institute, Belgaum.

RAI BAHADUR.

Rai Sahib Lala Hari Ram, Assistant Surgeon (retd.), Delhi.

SARDAR SAHIB.

Mr. Rajinder Singh, Burma Medical Service, Civil Assistant Surgeon, General Hospital, Moulmein, Burma.

KHAN SAHIB.

Maulvi Muhammad Ishaq Khan Majlish, Medical Practitioner, Dacca.

Munshi Moin Khan, Deputy Superintendent, Civil Veterinary Department, United Provinces.

RAI SAHIB.

Babu Jamini Kanta, Roy, Medical Practitioner, Bakarganj, Bengal.

Dr. Satish Chandra Ghosh, Teacher of Surgery, Dacca Medical School.

Current Topics.

The Reign of Quackery.

(Abstracted from *The Medical Officer*, September 27th, 1930, Vol. XLIV, No. 13, p. 131.)

THE damage done by quackery, both directly and indirectly, is enormous. Though the stupidity of taking "remedies," whether patent or otherwise, without a precise knowledge of what they are, what they do and whether their action, if any, is indicated, is obvious to all who know the rudiments of physiology, the suppression of the nefarious traffic is difficult, because the quacks are clever and the people ignorant. In this country quackery is protected and the patent medicine stamp is a source of revenue; what the Ministry of Health earnestly desires to suppress, the Treasury encourages. The loss to the country through insurance payments for damage done by patent medicines is, however, much greater than the gain from stamps, so that Government fostering of quack remedies is financially unsound. However, patent medicines are but a small item in quackery and not the most serious. Under national insurance about 50 millions of bottles of physic are dispensed annually. Much of this does no good, but as those who prescribe it make no pretence that

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it has any virtue and carefully guard against its doing any damage, it cannot be called quackery, although it panders to the popular ignorance and superstition which is the cause of quackery. England always has been a happy hunting ground for quacks, and will continue to be so until health instruction becomes an integral part of public education. As it is, it is not only the uneducated who indulge in these "remedies," they are found in most households and used by persons who in other directions are quite intelligent, and who would be incapable of crimes against physics, mathematics or humanities comparable with those which they commit so freely against biology. The magistrate who will detain for medical examination a plaintiff who has brought an action against an old woman for bewitching his cow, will go home and in full faith dose himself with something, the composition of which he is ignorant, to cure something which he has not got.

Remedies are divisible into two classes—those that have no action and those that have. The former are the commoner and do no physical harm, but they are potent causes of various neurotic and psychic disturbances which produce much misery and incapacity. The quack remedies which do have some action rank amongst the causes of chronic disease, for any drug which has an action which might be useful under certain conditions, is bound to be harmful in every other state.

Amongst the rich, self-drugging is chiefly an expression of ignorance; amongst the poor it is, in addition, a source of greater poverty. For the rubbish is expensive and many children and adults go short of food and clothing to spare money for this form of superstitious luxury. The millions which are made by companies trafficking in patent and proprietary nostrums are mainly wrung from the poor, for though the wealthy are just as stupid they are far less numerous than the poor, and all classes pay the same price.

There is nothing put up in bottle, box or tin which is necessary for human nutrition; there is nothing manufactured which is not less valuable than the raw material from which it was made. The food of man consists of animals and vegetables, and the less they are altered from the state in which they are culled, the better they are as food. Milk, eggs, butter, cheese, green vegetables, roots, cereals, fruit, with fish or flesh occasionally, together with water, constitute the whole of our diet, and we are designed to eat these substances as they are provided. There are states of disease where a diet of a somewhat artificial character may be required; there are some in which a few drugs are believed to do more good than harm, but nobody but physicians needs to know anything about these, and in normal circumstances the healthy would be better if ignorant of their existence. Sir Leonard Hill's plea is for simplification: all his researches have led him to simplify the maintenance of health and the treatment of disease. Indeed, all biological research leads in the same direction. It is, however, the extreme simplicity of modern medicine which makes it difficult. Just as perhaps the finest passage in literature contains but six words, the longest of which has three letters only, so does the highest form of practical physiology consist of little, used seldom, but always the right agent at the right time. The public do not understand that behind what sounds so simple, so obvious and so feeble, lies the whole of the science of generations; they are not impressed by truth, they are dazzled by magic.

The Treatment of Chronic Nephritis.

By H. A. BULGER, M.D.

(Abstracted from *The Journal of the Missouri State Medical Association*, September, 1930, Vol. XXVII, No. 9, p. 452.)

A CONSIDERATION of the treatment of chronic nephritis must involve two separate problems. We are concerned, first, with therapy designed to compensate for and correct abnormal renal physiology, and, second, therapy aimed to rectify the underlying condition causing the nephritis. The latter is a most difficult problem because of our slight knowledge of the ætiology of non-suppurative kidney disease. So often we are helpless to stay the slow advance of the malady, not knowing why it exists. It appears certain that in many cases the process is of the nature of an obscure and puzzling response to a remote local infection. In each case the removal of the obvious foci of infection must be seriously considered, but gratifying results from such a procedure, though common with children, are rare with adults. Other cases of chronic nephritis are manifestations of degenerative arterial disease and hypertension. There are undoubtedly examples, perhaps many, where the disease is due to a hypersensitiveness to certain foods. It seems barely possible that still others may result from unrecognized metabolic or endocrine disturbances. Such statements as these are evidence of the futility of attempting at the present time to recommend any specific treatment directed at ætiological factors. There are, however, important therapeutic measures to be considered in relation to the general condition of the patient.

It is obviously irrational to treat all cases of chronic nephritis alike. One must be guided by the abnormal physiology presented. One need not be disturbed by the great confusion as to the classification of the nephritides but proceed after he has considered what function or functions of the kidney are abnormal.

In one group of patients the outstanding feature will be a high level of non-protein nitrogen in the blood and a tendency toward the development of an acidosis and manifestations of uræmia. The high non-protein nitrogen indicates the increased head of pressure necessary to maintain the body in daily nitrogen balance. Part of our treatment aims to reduce the protein metabolism to a minimum. Marked restriction of the protein intake is unwarranted. Partial protein starvation results in the use of protein from tissue, obviously not an ideal condition in the presence of disease. It is erroneous to think a low utilization of protein by the body will necessarily follow a curtailed protein intake. Complete starvation may be the equivalent of a moderately high protein diet. It is certain that an adequate caloric intake is essential to spare protein in the body. The problem is, therefore, far from solved if one only reduces the protein. That carbohydrate saves protein much better than fat has been demonstrated beyond question. We thus realize that the dietary regimen of these patients must consist in moderately limiting protein and forcing carbohydrate. The latter we consider the more important of the two. The experiments of Whipple on the effect of carbohydrate on various types of acute hepatitis indicate that excessive carbohydrate allows cells better to resist injury. This phenomenon may be of the utmost importance in treating chronic nephritis.

These patients will require at least two-thirds of a gram of protein per kilogram of body-weight per day if the caloric intake is adequate. An adult must be allowed a small helping of meat, bacon and two glasses of milk each day. The other foods of the diet will supply additional protein. One to three eggs can be substituted at times for the meat. Specific directions for taking high carbohydrate should be given.

Another function of the kidney is frequently defective in the presence of nitrogen retention, that involving the excretion of acids. It is not uncommon to find an acidosis. When marked this is evidenced by hyperventilation. Under these circumstances alkali is usually beneficial and may be given in the form of fruit and sodium bicarbonate. Perhaps a better procedure is to administer continually 20 to 40 grains of calcium carbonate with each meal. Briggs has emphasized the usefulness of calcium in increasing phosphate excretion by way of the gastro-intestinal tract.

Should we limit salt in the uræmic type of nephritis? These patients may not have œdema until late, when cardiac failure develops. There are actual disadvantages in limiting salt. Lack of salt makes food so unpalatable

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that we suffer difficulty in getting a patient to take the high calories which are so necessary. Furthermore, these patients even tend to excrete excessive amounts of salt in the urine. One often finds a low concentration of salt in the blood; very low if there has been vomiting. It is not entirely irrational to conclude that these patients as a rule actually need salt. Needless to say, fluids should be forced within reason. The use of saline cathartics or sweating is strongly contra-indicated, for these procedures tend to weaken and dehydrate patients, simply remove fluids which would better go through the kidneys.

Considerable difficulty may be encountered in attempting to alleviate uræmia. Vomiting has usually resulted in starvation and dehydration. The carbohydrate reserves are low. The body has suffered a serious loss of salts. The picture is that of toxæmia. Such patients need salt and large amounts of carbohydrate. It seems well to be conservative in administering fluids, because œdema of the brain is an obscure factor and may be an important part of the uræmic state. It is advisable to give physiological saline solution subcutaneously and only concentrated glucose solution intravenously. Sufficient carbohydrate cannot be given parenterally. One should attempt to give 400 to 500 grams a day. A most satisfactory procedure consists in administering thick fluid feedings through a nasal tube. The following mixture is suitable:

Milk	1,000 c.c.
Cream	300 c.c.
Cornstarch	150 grams.
Sugar, Glucose or Karo syrup ..	300 grams.
Salt	5 grams.

Make up to 1,500 c.c. and divide into ten feedings for the twenty-four hours, eight for the day and two for the night. A little heating in a double boiler will produce the desired thickness. Sugar in the mixture is more likely to cause diarrhœa than glucose. After a few days, if these feedings are to be continued, four eggs and 200 c.c. of tomato juice should be added. A patient who is vomiting will retain a large part of the feedings and the vicious circle may thus be broken.

Patients of the type under discussion may develop an oliguria with marked exacerbation of symptoms. Under these circumstances a striking diuresis and improvement may follow 300 to 500 c.c. of 1 per cent. magnesium sulphate solution given very slowly intravenously. The diuresis does not start immediately but after a delay of about twelve hours. This same effect has been observed with oliguria associated with so-called surgical kidneys.

Another group of patients will present an entirely different type of abnormal physiology. One refers to those where the ability of the kidneys to excrete salt and water is defective and the prominent feature is œdema. There is ample evidence to prove that salt has a definite influence on nephritic œdema, and that it is the sodium rather than the chloride which causes the retention of water. The question arises as to how radically salt should be restricted in treating œdema. The question can be answered from actual experience. The average normal individual ingests 8 to 10 grams of salt a day. If he just stops adding salt to the diet this will be reduced 4 to 5 grams. A diet prepared with foods poor in salt may contain only two grams a day. Patients have been studied on the latter while their weight was stationary or gradually falling. Adding only three grams of salt per day resulted in an immediate increase in weight and œdema. Although radical restriction of salt will not in itself cause a decided diuresis it removes a factor which definitely inhibits diuresis. Special instruction should, therefore, be given to reduce the salt intake to a minimum.

To what extent should protein be limited in the pure salt water retention type of nephritis? Space prevents a detailed discussion of the protein metabolism of these patients, but it is imperative to emphasize the quantitative aspect of albuminuria. These patients commonly excrete 20 to 30 grams, occasionally 40 to 60 grams of protein in the urine each day. This may even mean a greater protein requirement than normal. It contra-indicates a marked limitation of protein. High protein diets have been recommended for these patients and beneficial results have been reported. But the same effect may be obtained in a little different way. The diuresis from high protein is probably due to the diuretic action of the additional urea formed. If equivalent amounts of urea are administered instead of the excess protein certain disadvantages of the high protein are avoided. High protein through its specific dynamic action may conceivably increase metabolism to a degree which would be distinctly detrimental. Since most protein foods contain considerable salt, high protein diets must necessarily contain unwarranted amounts of salt. Urea is not dramatic in its action. To adults one gives 30 to 45 grams a day. One must be prepared for failures for if much urea is retained the patient may even gain weight. The use of urea is, of course, futile in the mixed cases where nitrogen retention and œdema are both present.

There are no diuretics to be especially recommended in chronic nephritis with œdema. Some effect may be obtained from acidotic chemicals, such as ammonium chloride and ammonium nitrate. The purine diuretics are seldom effective. One feels that the use of mercurial diuretics in chronic nephritis is quite irrational. Although they may act most dramatically there is too much danger of leaving the kidneys in a worse state than they were before. The magnesium sulphate solution discussed above does not cause a diuresis in œdematous types of nephritis.

What can we do of a more general nature with our attention focussed on the disease itself rather than on the more evident abnormal physiology? The natural tendency for injured tissues to revert to normal is no doubt present in nephritis. We can aim to give these natural processes the most favourable opportunity to function. This is not accomplished by marked dietary restrictions. One should probably spend more time in telling the patient what to eat than what not to eat. One must be sure his patient is getting adequate calories, biologically good protein, calcium in milk, iron, his allotment of vitamins—to aim toward perfect nutrition. At the present time the most important suggestion to make is not to fail to *feed* the patient with chronic nephritis.

Recent Head Injuries.*

By WILLIAM DOOLIN.

(Abstracted from *The Irish Journal of Medical Science*, Sixth Series, No. 57, September, 1930, p. 497.)

EVERY medical man is liable to be called upon at one time or another to take charge of a case of serious head injury; in undertaking the care of these very anxious cases he accepts the responsibility of replying to the many questions asked as to the future of such patients as may survive the infliction of serious head injury; and, whether he likes it or no, at the heel of the hunt there is not infrequently a subpœna to add to his troubles, when his wits will be taxed to their utmost to supply satisfactory answers to the disingenuous subtleties of cross-examining counsel!

During the session now drawing to a close, I have had under my care 7 cases of severe head injury. Six of these occurred in male subjects; one in a woman. All of them, curiously enough, when one considers how many Dublin children have as their only playground our open streets, were adults. Of the seven, two were due to falls from a height; five were directly due to accidents with motor cars or cycles—the proportion is significant. Two were fatal; both were cases of fracture of the anterior fossa, in which the line of fracture involved one of the accessory nasal sinuses, from which a coccal infection led to septic meningitis.

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* Postgraduate Lecture delivered at St. Vincent's Hospital, Dublin, on June 19th, 1930.

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Case 1.—*Undiagnosed fracture of base of skull, with predominating pulmonary symptoms. Death from septic meningitis.*

M. D., seamstress, aged 46 years, was admitted at 11-30 a.m., November 23rd, 1929, complaining of pain in the front of the chest, due, she alleged, to having been knocked down by a cyclist two nights previously. On admission her temperature was 103.4°F., pulse 124, respirations 28. The doctor who referred her to hospital suggested in a note that she was suffering from "pericardial effusion or pneumonia." The only signs of external injury were a hæmatoma over the third right metacarpal, some bruises over the left iliac crest, and an ecchymosis of the left eyelid; there was no conjunctival hæmorrhage, the pupils were equal and reacting, and all ocular movements were normal. No other sign of injury was present on trunk or limbs. The tongue was coated at the sides, clean on dorsum; several decayed teeth. There was no history of concussion, but it was stated that the night before admission she had twice vomited blood.

Examination of the thorax disclosed a normally situated apex beat. Heart sounds were clearly audible and normal. Chest clear on percussion, front and sides (back not examined, owing to patient's statement that she could not sit up or turn on her side). No cyanosis. No venous engorgement of neck or chest.

On November 24th she was examined by a colleague, temperature 103°F., pulse 132, respirations 30. A well-marked herpes labialis had developed at the left angle of the mouth overnight. On palpation, distinct crepitation was found over the third right costo-chondral junction; the skin and tissues near this site had a "boggy" feel over an area as large as the palm of the hand; the entire area was crepitant and tender on pressure. There was some dulness over the pulmonary bases, but no change in the respiratory sounds. Aspiration was performed, but was negative at three puncture sites.

On November 25th a radiogram was taken. The film definitely excluded a hæmothorax, but to our surprise disclosed an unusually high ascent of the right hemidiaphragm, up to the fifth right interspace. The liver shadow was not displaced downwards. The diagnosis now suggested was that of subphrenic hæmatoma, probably from a ruptured liver, due to the fall. Through a Narath exposure the subphrenic space was fully explored, but with absolutely negative findings.

The subsequent clinical course became more and more confusing. The temperature continued to oscillate between 101°F. and 104°F., with a pulse rate of 120–140. The respiration rate was likewise fast (averaging 32–40). At no time had she any cough or sputum. A blood count showed a polymorphonuclear leucocytosis. Signs of a congestive basal pneumonia developed on the left side.

Abdominal distension set in on the 3rd day after operation. This was relieved by pituitrin and enemata. She had no vomiting at any time. Saline and glucose enemata were well retained; the patient drank freely. At no time did she complain of headache, the sole allusion to pain on her part being in the left iliac fossa. This was relieved by enemata.

She developed a gentle delirium on December 2nd, and was unconscious when she died, on the 12th day after admission.

It is to be noted that up to the day of her death at no time had there been headache, vomiting, pupillary dilatation or any sign of involvement of the cranial nerves. A few hours before death her axillary temperature was 104.6°F.

Post-mortem report.—Subject of rather less than normal stature, of "worn" appearance and looking rather older than age given. Bruises over left iliac fossa and over the dorsum of left hand. Operation wound, healed, behind and below right lower ribs.

Skull.—Calvarium normal. Rarefying osteitis present in the mastoid portion of the petrous bone. Middle ear opened, but found normal. Small fissured fracture (1.5 cm.) of the bone covering the left orbit. Dura mater and sinuses normal. Lakes of tough, yellow, viscid pus are present beneath the pia mater, over the whole cerebral and cerebellar surface. The pons is free, but the upper cervical portion of the cord shows one such purulent patch.

Eyes.—Right eye normal. Bone over left eye (base of brain) fractured into the ethmoidal sinus. Hæmorrhage and pus found in the superior muscles of the left eye, and in the ethmoidal spaces.

Lungs.—Right lung partly collapsed. Diaphragm up to level of third rib where it joins the sternum. Pleura adherent, but no pus in pleural cavity. Left lung densely adherent at apex; both base and apex present a congested and pneumonic appearance.

Heart.—Small, with some fatty infiltration; pericardium normal.

Liver.—Normal in appearance and texture, but is much above normal level, in accordance with raised level of diaphragm. Spleen, gastro-intestinal tract and kidneys normal.

Special notes.—There were numerous lakes of pus over the cerebrum and cerebellum—a true leptomeningitis. Smears were taken. Cultures show (*i*) streptococci. (Note: Capsules could not be demonstrated; pneumococci excluded); (*ii*) large Gram-positive cocci (contamination?). Smears of the pus from the infected ethmoidal sinus show a similar finding. No pus was found in the rarefied osteitis of the mastoid. The middle ear bones were removed, and the middle ears were normal. The second, third and fourth ribs on the right side were surrounded by pus, which was infiltrating the tissues at this site. The pus did not proceed from or enter the pleural cavity. The third rib was fractured 1 cm. from the costochondral junction: the pus appeared to be proceeding from this point. The pus was in part brownish (blood extravasated from fracture site?) and in part thick and yellow. Smears from this pus showed an exactly similar picture to that found in the brain and in the ethmoidal sinus.

Nature of disease.—Fracture of orbit extending into ethmoidal sinus, with resulting streptococcal leptomeningitis. Fracture of rib, with streptococcal fixation abscess. Old pleuritic (tuberculous?) adhesion; collapse of lung (paralysis of right phrenic nerve?); congestive pneumonia of right base.

In this patient's case the history of the injury given on admission, the signs of chest injury, and the radiographic evidence of the elevation of the diaphragm all combined to lead us on a false trial of diagnosis. The complete absence of cerebral or ocular symptoms left us entirely unprepared for the ultimate revelation of the true state of affairs at the post-mortem examination. Here we have an example of a patient suffering from a basal fracture of insignificant proportions which by virtue of its anatomical site gave rise to no clinical signs, yet was of lethal effect by reason of the infection transmitted across its path.

The next case also had a fatal outcome from much the same type of lesion. Here the diagnosis of an intracranial injury was established at the bedside, but its true pathological nature was not revealed by operation.

Case 2.—*Severe head injury due to fall from a roof; erroneous diagnosis of intracranial hæmorrhage; death from septic meningitis.*

L. R., labourer, aged 54 years, was admitted at 12-40 p.m. on February 8th, 1930, from Corporation ambulance, having fallen from the roof of a two-storeyed cottage which he was engaged in slating. While being carried from the ambulance to the dressing-room he was very violent, as if intoxicated, but during our preliminary examination he suddenly relapsed into a state of profound unconsciousness, in which condition he was brought to the ward.

On admission, his temperature was 98°F., pulse 44, soft and regular, respirations 22, easy, even, not noisy. There was no cyanosis of the eyelids. He was bleeding slightly from a small wound over the right external

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angular process. The pupils were unequal, the left being moderately contracted and reacting to light, the right widely dilated and fixed. Although unconscious, he had marked photophobia. No strabismus. There was a dorsal dislocation of the right wrist, which was immediately reduced. The limbs were not flaccid, and there was an active extensor response on the soles of the feet.

At 8 p.m. he was still unconscious; the pupils were still unequal; the pulse rate had risen to 68, and the respirations were 20, easy and silent.

He had a quiet night. Next day, still unconscious, no pupillary change. Temperature 99.6°F., pulse 72, respirations 20. Retention of urine; catheter passed. No vomiting since admission.

On February 10th he was still unconscious. Fundi examined; no papillœdema, nor congestion of vessels.

Next day he partially recovered consciousness, answering slowly and coherently when spoken to; could put out his tongue, and move all his limbs as requested. Lumbar puncture showed clear fluid under slight tension. The laboratory report on the C. S. F. was: "Fluid almost clear. Reaction alkaline. Albumin present, globulin absent, sugar present. A fair amount of blood present. Some leucocytes (due to the blood). No organisms found."

On February 12th he complained of right frontal headache. The small scalp wound was now healed, without sign of inflammatory reaction. He was conscious, but apathetic, yet spoke quite clearly. Ptosis of right upper eyelid: right pupil still dilated, not reacting. Hypertonic saline injection per rectum produced no obvious improvement.

February 13th. Ptosis; fixed R. pupil. All ocular movements voluntary and normal. No diplopia. Head quite clear. No facial paresis. Keeps lying on R. side, and slightly irritable.

On the basis of the original injury, the fixed state of the pupil, the right frontal headache, the blood in the C. S. F. and the continued cerebral irritability, a presumptive diagnosis of a subdural hæmorrhage in the right fronto-parietal area was made. A large right fronto-parietal decompression operation was performed (February 15th). There was no sign of a fracture of the vault, and no extradural clot. The middle meningeal vessels were divided during the bone section, and the hæmorrhage arrested by a pad cut from the temporal muscle. The dura was not pulsating, but was not discoloured. On opening the dura, C. S. F. escaped freely, not at first blood-stained. The cerebral cortex was œdematous, with obvious congestion of the pial vessels; there was no sign of cortical injury, nor of a subdural hæmorrhage. Towards the close of the investigation a free flow of fresh venous blood took place from beneath the temporo-sphenoidal lobe, presumably due to wounding of a pial vessel in elevating the brain. A flat rubber drain was inserted to the base of the brain, and led out through the posterior angle of the wound. The osteoplastic flap was replaced, and the scalp wound sutured.

On his return to the ward, the patient was very restless. His temperature was 98.20°F., pulse 120, respirations 24. Both pupils were equal, and reacting to light.

The restlessness persisted throughout the night. On the next morning the pupils were unequal as before the operation. This restless state persisted for several days; luminal, bromides, rectal salines were given, but with very little effect.

On February 20th, the restless phase had subsided, but photophobia was very marked. The patient was very irritable, and refused even drinks. The temperature was now 101°F., pulse 100, respirations 20. The brain was pulsating without tension through the bone flap. The scalp wound was healing per primam. He answered when spoken to, but slowly and with effort. Abdominal reflexes sluggish. Rectal injections of mag. sulph. (50 per cent.) solution were given repeatedly on this and following days, but with no physiological effect. The patient steadily became more delirious, with oscillating temperature and rising pulse rate, and died four nights later.

Post-mortem report.—Tall, spare, but healthy subject. Bruises on F. forearm. Pressure sores on both heels. A scar (1″) over R. external canthus. Practically healed operation wound over R. frontal area. Cranial vault normal except for R. fronto-parietal trephine wound. No abnormality present in dura mater or sinuses. Arachnoid and pia mater markedly injected. A small amount of pus was present, not marked, in operation area. Purulent lepto-meningitis was more marked on left cortical surface. Small fissured fracture in orbital plate, running over ethmoid cells posteriorly. Spinal cord not examined.

Both of these patients, therefore, died of septic meningitis as a sequela to fractures of the base of the skull; the fractures were insignificant as fractures: it was their localisation in direct continuity with air-sinuses, presumably the seat of infection, which formed the all-important factor. It is to be noted also that both these cases occurred at a season of the year when nasal catarrh is at its highest incidence.

The risk of septic meningitis would at first sight appear to be much higher in cases of open wounds of the scalp and vault. Such cases, however, are usually brought to the operating theatre without delay, and a primary excision of the presumably infected wound, if timely performed, will obviate the risk. In two cases of extensive lacerated wounds of the fronto-parietal vault the patients made a complete recovery, thanks to early operation and skilled nursing.

Case 3.—*Severe compound fracture base and vault of skull, with dural tear and laceration of frontal lobe. Immediate operation. Recovery.*

F. C., window-cleaner, aged 21 years, was admitted at 11-30 a.m. on May 21st, 1929, from Corporation ambulance. The ambulance men stated they had been called to a house in Merrion Square where the patient had fallen into the basement area from a ladder outside the second storey window. In falling, his forehead had struck the coping stone bearing the railings guarding the area. He was unconscious when received into the ambulance, and was bleeding profusely from a large gash across the forehead. In the ambulance on the way to hospital he recovered consciousness, and on admission, when examined in the casualty room, he was in a state of acute traumatic delirium. Within a few moments of being put to bed in the ward, however, he relapsed into a state of profound unconsciousness.

A superficial examination of the wound disclosed a gaping fracture of the skull. He was immediately brought to the operating theatre, and there, under light ether narcosis on an open mask, a detailed examination revealed the following injuries: there was a wide lacerated wound through all the layers of the scalp, running from the outer canthus of the right eye across both supraorbital margins and the root of the nose, and extending for nearly 2 inches up on to the left temple; beneath this scalp wound the entire frontal bone had been elevated, and was sliding back over the parietal portion of the vault of the skull in a manner comparable to the lid of an old-fashioned soup-tureen. Over the left frontal lobe the dura and meninges were torn, and through the gap was protruding a certain amount of pulped cerebral tissue stained with earth dirt. The severe hæmorrhage had proceeded from a tear in the longitudinal sinus, which was still bleeding. The lateral nasal fossa and the ethmoid air cells were exposed on the left side.

After ligation of the torn sinus, the wound edges were excised, including the pulped brain tissue. The widely exposed tissues were freely disinfected with 5 per cent. mercurochrome 220, and strands of silkworm gut placed as a drain across the cerebral surface. It was found impossible to suture the meningeal tear. Anchoring periosteal sutures (catgut) were placed at the four corners of the elevated frontal plate, which fitted back snugly into its correct anatomical position. Interrupted sutures were applied in the approximation

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	Control Cases	Cases treated with S.U.P. 36
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Average duration of headache in days . .	2·1	1·0
Average duration of muscular pain in days	3·4	1·3
Average number of days in bed . . .	5·7	2·8
Average number of days off work . . .	16·0	6·9

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of the skin edges. The patient returned from the theatre at 1-40 p.m., when his temperature was 97.2°F., pulse 72 and respirations 20.

Two hours later the pulse rate fell to 66; at 6 p.m. it was 60, but he had recovered consciousness, and knew he was in hospital, though he had not the slightest idea of what had happened to bring him there.

On the night of the operation he was extremely restless. This state of restless irritability continued for the next five days and nights, and notwithstanding the free drainage of blood-stained fluid from the angles of the wound, was doubtless due to traumatic œdema of the brain. At no time in his post-operative course had he any vomiting. For four days he had retention of urine, the bladder having to be emptied by catheter.

On the 26th (5th day p. o.), there was a well marked œdema of the left eyelid; at the left orbito-nasal area of the wound there was some purulent discharge, due to infection in the region of the nasal duct. The fundi were normal. The patient's consciousness was fully returned: he remembered the beginning of the fall from the ladder, but his mind was a blank from that moment.

The scalp wound healed uneventfully. The orbito-nasal angle of the left eye continued to give trouble for some weeks, but ultimately cleared up. The post-operative course was afebrile throughout, and eventually the patient left hospital on the 31st day after his admission.

Since leaving hospital the patient has been carefully followed up. No alterations of the cerebral function have been manifested. Save for recurrent attacks of subacute infection in the left nasal duct, he has had no unpleasant sequelæ following in his very severe head injury. He has not yet returned to work.

Case 4.—*Severe concussion and œdema of brain from motor accident. Scalp wound. No fracture of vault of skull. No dural tear. Immediate operation. Recovery.*

B. S., schoolboy, aged 17 years, was admitted at 4-15 p.m. on April 13th, 1930, from Corporation ambulance. He had been riding a motor bicycle, and, coming too fast round a corner on the wrong side of the road, had collided with a motor omnibus; a witness of the accident, who accompanied him to hospital stated that he "seemed to fly over the bonnet of the 'bus, and sail head-on into an electric tram standard on the other side"!

When I saw him (5-30 p.m.) he had recovered from his initial concussion. His temperature was 97°F., pulse 84, respirations 20. He was dazed, very excitable and restless on examination. Pupils equal and reacting. Bleeding severely from two deep fronto-parietal scalp wounds on the left side of the head. He was immediately taken to the theatre for a more detailed examination under light ether narcosis.

The edges of the two wounds were excised. Through the wounds it was observed that the periosteum of the vault bones was badly torn, but no fracture of the skull was seen. Into the bony substance of the vault was ground a large patch of green paint from the tram standard; this we failed to rub off, even with a sterilised nailbrush. The left upper eyelid had been detached in the process, both the supraorbital artery and nerve had been torn across; these were ligated, and the wound closed with interrupted catgut sutures. The larger fronto-parietal wound was similarly treated. The terminal pad of the left thumb had been partially avulsed from its base, leaving the nail and terminal phalanx intact; this was disinfected and fixed with a single suture.

During the night the patient was quiet, but did not regain consciousness. He vomited a great deal; as there was some blood in the vomited matter, it is possible he had sustained a basal fracture.

On the following day he was still unconscious. The pulse rate had sunk from 96 (at 6 a.m.) to 70, 66, 64, 60, 58, 52, for the next 12 hours. He became very restless; it was difficult to keep him in bed; owing to his violent resistance, two efforts to administer intravenous saline had to be abandoned. In this case, too, there was retention of urine for several days following operation. He was given ounce doses of mag. sulph. to drink hourly, and two injections of a 50 per cent. solution of mag. sulph. were administered per rectum. The physiological response was satisfactory, for on April 16th (3rd day p. o.) he became quiet, and consciousness returned. Full control of the bladder was not regained till April 18th. The pulse rate on the 16th, 17th and 18th was still in the 50-60's, and remained at this rate for another week. This was, however, the only physical sign of brain injury remaining, and after an uneventful recovery he went home on the 30th day. He does not yet recollect the accident nor his journey to hospital.

To the lay mind fracture of the skull is associated with a vision of a very high mortality. To the lawyer, who is professionally concerned only with survivals, the question of main interest centres round the survivor's subsequent capacity for work and probable period of disablement. From the immediate relations the question that has been most frequently put to me, once the patient is on the road to physical recovery, has been: "Doctor, will his brain be affected?" These are all questions to which we, in our capacity as medical attendants, are expected to provide an infallible answer, and, as is so often the case with such questions, when we turn to the textbooks for an answer, our search is vain.

Taking the first question—that of mortality—my last year's experience (2 out of 7 cases) has been exceptionally high. In general, as you know, fracture of the skull *per se* is not any more serious than fracture of the collar bone; the lethal factor lies in the possibility of an associated injury to the skull contents. In many instances of head injuries serious damage has been done to the cranial contents without any fracture of the skull at all.

To what actual factors may the mortality of head injuries be due? Vance, of New York, has published (*Arch. Surg.*, 1927, XIV, 5, 1023) an analysis of 507 cases of fracture of the skull in which the cause of death had been determined by post-mortem examination. His results were as follows:—

	Per cent.
Compression due to intradural hæmorrhage or laceration of brain	30
Concussion	27
Compression due to extradural hæmorrhage	12
Meningeal sepsis	9
Associated injuries	6
Secondary (hypostatic pneumonia) ..	4

Compression, you will observe, was responsible for 217 deaths out of 507 cases in the series (42 per cent.). The majority of these cases were associated with either serious intradural hæmorrhage or else laceration of the brain: both occasions of gross injury to brain tissue. In compression of the brain due to extradural hæmorrhage the considerably lower mortality figure is due to the fact that the clinical symptom-complex of this latter injury is much better known, the lesion is of slower development, and timely operation saves a great many lives. Of four patients suffering from middle meningeal hæmorrhage whom I have operated upon, all have survived. Most extradural hæmorrhages, incidentally, are due to tearing of the middle meningeal artery; the posterior branch is much more frequently involved than the anterior; the bulk of the hæmorrhage is usually found beneath the vault, only in a few instances spreading to the base of the skull. Less than 25 per cent. of fractures involving the middle cranial fossa are associated with this complication. Owing to the shallowness of the grooves in the adolescent skull, middle meningeal hæmorrhage is rare in children; it is a sequela of fracture of the skull almost wholly confined to adults.

That uncomplicated concussion of the brain should be associated with such a high mortality figure as 27

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per cent. was, I confess, a surprise to me. To the best of my recollection, I have never seen a fatal case of uncomplicated concussion of the brain. But in these cases reported by Vance (139 in all), the majority of deaths took place within one hour of injury; no case survived more than 10 hours; in all, post-mortem examination failed to disclose any associated cerebral injury which could have caused death.

What actual physiological change takes place in the human brain to produce the clinical condition we know as concussion, we have no experimental proof. Since Alexander Monro laid down the formal anatomical generalisation that "the brain is enclosed in a rigid case of bone" a century and a half have passed by, in which space of time whole oceans of ink have been spilt in *a priori* argument on the subject, but not one of the many ingenious hypotheses advanced has been experimentally proved in the human subject.

Clinically, we understand that concussion is a condition which follows instantaneously upon injury to the skull, with a pronounced tendency to spontaneous recovery. Its symptoms are referable to the cerebral cortex in the loss of consciousness and the accompanying flaccid paralysis of the skeletal muscles; to the medulla, in the alterations manifested in the pulse rate, blood pressure and respiration; possibly also to the labyrinth, in the vertigo and vomiting which so commonly mark the early moments of recovered consciousness. Pure concussion *can* cause death, as we know, just as shock can; in these cases death may possibly be due to asphyxia, from rapid failure of the respiratory centre.

The various theories of concussion are unsatisfying. The light flick to the chin that may knock out a boxer, rendering him instantaneously unconscious, paralysed, to recover within 10 seconds to fight on automatically under Marquess of Queensberry rules, cannot, to my mind, be explained by facile allusions either to acute anæmia of the brain or to a hyperacute compression of the least elastic portion of the skull. The French view of *ebranlement*, the *commotio cerebri* of Kocher, conveys to my mind a more satisfactory, if none the less hazy, conception of what has taken place within a skull which has been the victim of sudden violence from without.

In lecturing to students, I find they most easily grasp the division of brain injuries into *concussion, contusion* and compression. By "contusion" is understood a continuation of cerebral symptoms with or without recovery from the initial unconsciousness of concussion, but short of the relapse into coma characteristic of serious compression, such as is met with in cases of middle meningeal hæmorrhage. The main pathological change in the brain tissue is the presence of a true œdema of the brain substance, which may be localised or general. The chief symptoms are general cerebral irritability associated with a slow pulse of moderately high tension, intermittent periods of acute restlessness, and a minor degree of papillœdema. The two patients whom I have at present under my care here are typical examples:

Case 5.—*Severe concussion due to motor accident. Basal fracture. Consequent traumatic œdema of brain, with symptoms wholly relieved by rectal injection of hypertonic saline solutions. Associated depressed fracture of malar-zygomatic compound, restored by operation.*

H. H., apprentice, aged 19 years, admitted at 6 p.m. on June 7th, 1930, in an unconscious state, following a collision between his motor-cycle and a motor car. On admission he was bleeding from the right ear and both nostrils, and there was also marked right subconjunctival ecchymosis. Both pupils were dilated, equal, and reacted to light. Temperature 96.4°F., pulse 68, respirations 20. There was an incised wound (1.5 cm.) over the left eyebrow, with another over the left side of the chin; several minor cuts on left arm and hand.

Shortly after admission he developed acute traumatic delirium; although unconscious, he was shouting, and had to be held down in bed. He vomited an hour or so after admission; the vomiting contained much blood. Passed urine involuntarily.

The following day he had not regained consciousness. (Temperature 98, pulse 72, respirations 24.) Towards evening he became very restless. No focal twitchings observed, no paralyses; he resisted forcibly any passive movements of his limbs and attempts to inspect the pupils. Two rectal injections of 25 per cent. saline solution were administered: the first acted as a wash-out, the second was retained.

June 9th. Had a quieter day. Was quite conscious for short intervals, giving sensible answers to simple questions as to how he felt or if he would like a drink, etc. Rectal injections repeated. (Temperature 98, pulse 60, respiration 18.)

June 10th. Fairly quiet, with restless intervals. Slept well; passed urine involuntarily. (Temperature 97.8, pulse 58, respirations 20.)

June 11th. Brain much clearer. Pulse still in the 60's. Very hungry, asking for food, but states his "face hurts on chewing." A unilateral depression of malar-zygomatic compound (L.) noticed for first time. Rectal injection repeated, as there is some slight evidence of papillœdema. (Temperature 98.2, pulse 60, respirations 20.)

The restless condition gradually subsided within the next few days, and on the 16th inst. the depressed malar bone was elevated (Kilner operation) under light ether narcosis. It is to be noted there was no orbital hæmorrhage on this side. From the 18th inst. onwards his pulse rate remained normal.

(This patient made an uneventful recovery, and went home on June 28th. The only sign of his injury then present was a flame-shaped subconjunctival hæmorrhage on the right eye. At the time of his leaving he had complete amnesia for all events from the morning of the accident (he does not remember even going to work that day) till June 14th. From this latter date onwards he was the cheeriest patient in the ward.)

Case 6.—*Extensive fracture base and vault of skull, with concomitant cerebral œdema. Relief from rectal injection of hypertonic mag. sulph. solutions. Recovery.*

S. M'A., 24 years, Civic Guard, was admitted by ambulance on June 18th from a County Infirmary, with the following history. On June 9th he had been brought to the County Home in an unconscious condition, having been knocked down by a motor cycle. He recovered consciousness very slowly, had complete amnesia, and, on account of his persistent drowsiness, slow pulse and the sudden development of facial twitchings on the left side, it was considered advisable to transfer him to a more active surgical centre.

On his admission to St. Vincent's, his temperature was 98.8°F., pulse 64, respirations 24. He was fully conscious, clear as to the discomfort of his journey (130 miles in a Ford car!), but could tell us nothing about the original accident. He spoke quite coherently, but slowly and with an evident effort at mental concentration. The pupils were equal and reacting to light. No subconjunctival hæmorrhages. No evidence of any involvement of the cranial nerves. No limb paralyses. His chief complaint was of severe frontal and parietal headache on the right side. During the course of our clinical examination he exhibited a curious "fit," in which without any loss of consciousness his head turned slowly to the right, and his lower jaw worked up and down in clonic spasm; this lasted for some 15–20 seconds and terminated by a voluntary and controlled expectoration of frothy sputum. These fits had been coming on, he explained, for the preceding three days, and he was very distressed as to their possible significance. The "fit" was not repeated.

The head was shaved, an ice-bag applied, and rectal injections of 50 per cent. mag. sulph. solution administered twice during the next 24 hours.

There was some distension of the retinal veins, and commencing optic neuritis of both discs.

Stereoscopic radiograms disclosed an extensive fracture of base and vault, which commenced below

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and behind the right mastoid process, ran forward above the temporo-parietal suture, and then extended upwards on the vault across the middle line.

The rectal injections of the mag. sulph. solution markedly relieved the œdematous condition of the brain; the headache and optic neuritis progressively diminished; on the 24th inst. the pulse rate was normal. From that day forwards he had only occasional headache, easily relieved by phenacetin and caffein, and on July 18th he was discharged fit and well to a convalescent home.

We have had three cases of fatal meningeal sepsis following on fracture of the skull in the hospital this year. In my two cases, the fracture was undiagnosed during the patient's lifetime; in the first of these cases its discovery at autopsy came as a revelation to us. The onset of the meningitis, Vance states, is insidious; my own experience fully confirms this observation, as also his further statement that sepsis once established is invariably fatal.

In our concentration on the injury to the skull and its contents we may perhaps overlook injuries elsewhere in the patient's anatomy. I shall not easily forget a moment of humiliation, some years ago when a resident student (with respectful glee in every tone of his voice) drew my attention to a dislocated thumb that I had overlooked on the patient's admission three days previously. In Case 5 of this series, it was only on the patient's recovering consciousness, and on the complaint that yawning hurt him that I realised he had a depressed fracture of his malar-zygomatic compound. This was restored to place by open operation a few days later.

Hypostatic pneumonia, it is easy to understand, may be the cause of death 10–20 days after injury in an elderly person confined to bed by reason of head injuries.

Turning now to cross-examining counsel, it has been estimated that of every 100 cases of serious injury that recover 40 per cent. are capable of returning to full work, 45 per cent. are capable of light work, and 15 per cent. are totally incapacitated. To judge from my impressions of war pensioners, I think the last is too low a figure; I would be more inclined to place it at 20 per cent., leaving the proportions 40, 40, 20, as a general estimate. When we go into the causes of partial or complete incapacity we find headache on exertion, mental or physical, to be the commonest; in many cases the headache has an organic cause (meningeal thickening, cysts or adhesions, subarachnoid hæmorrhages) which, when diagnosed, may be relieved by operation; in others, the headache is functional, but is none the less a very real source of incapacity to the sufferer. Deafness, due to involvement of the 8th nerve in the track of a fracture through the petrous portion of the temporal bone, has led to a patient of mine being dismissed from a post he had held for 28 years. Loss of memory of all events prior to his accident led to loss of employment (he was an actor) in a patient of my acquaintance; whether such traumatic amnesia is functional or organic is very difficult to say. Other causes of incapacity are well known, viz., traumatic neurasthenia, Jacksonian epilepsy, ocular troubles, etc.

The duration of incapacity following upon serious head injury, is a point we are often asked to determine by insurance companies; as a minimum period for full convalescence I always suggest six months.

To the anxious relative who enquires as to the likelihood of "brain changes" it is always well to give a guarded, but reassuring prognosis. Frontal lobe injuries are notoriously associated with occasional alteration in the patient's psyche or character.

The feeling of personal responsibility in dealing with these cases is a peculiarly grave one. So much will depend on the correct line of treatment. When faced with such a case, I try to answer to my own satisfaction two questions: "Do the clinical signs indicate the presence of an intracranial injury?" and "Do the signs of intracranial injury call for craniotomy?" The answers to these two questions depend upon the fullest consideration of the history of the injury and the patient's general condition, including in this any external signs of injury to the skull which may be present. To these diagnostic features must be added all the information obtainable from detailed ophthalmological and neurological examination, including lumbar puncture. Radiographic confirmation of our diagnosis, when available, is often of assistance, but is not a *sine qua non.*

In general, one has to distinguish in the unconscious patient who has been the subject of a head injury between three brain states: concussion, contusion and compression. In concussion, we follow a line of expectant treatment; compression calls for operative treatment; contusion of the brain with resultant œdema will often be rapidly relieved by the administration of hypertonic solutions of sodium chloride (30 per cent.) or magnesium sulphate (50 per cent.); if these fail to produce definite clinical improvement (in the absence of meningitis) the indication for a decompression operation is formal.

Reviews.

INSECTS, TICKS, MITES AND VENOMOUS ANIMALS OF MEDICAL AND VETERINARY IMPORTANCE.—By W. S. Patton, M.B., Ch.B. (Edin.), F.E.S., and A. M. Evans, D.Sc. Illustrated by E. M. Patton, A. M. Evans, and A. J. E. Terzi. With a foreword by Emeritus Professor R. Newstead, F.R.S. Part I. (Medical.) Made in Great Britain by H. R. Grubb, Ltd., Croydon, 1929. Pp. x plus 785, with 374 text figures, 60 plates, 3 maps, and large illustrated revision sheet. Price, 20s. net.

(WE regret extremely the great delay which was occurred in reviewing this most important work in our columns. The copy received for review was sent to a well-known entomologist in India for review. Unfortunately his MS review was lost, and he had then gone on leave. On return from leave he was asked to re-review it, but now prefers not to do so, as it would necessitate certain criticisms, which he would prefer not to make. Accordingly we have had to undertake the task ourselves, though singularly incompetent to do so.)

Produced from the Liverpool School of Tropical Medicine, this book is one which every entomologist, and all medical and veterinary workers dealing with insect-borne diseases cannot afford to be without. It is the first of a promised series of four volumes, and deals with the insects and Acarini of medical importance. Both authors have laboured in the fields of medical and veterinary science for many years, and both are very highly distinguished experts in the subject of which they treat. Major Patton's distinguished career in India is well known to our readers, many of whom will have found Patton and Cragg's wonderful *Textbook of Medical Entomology* (1913), invaluable both for reading and in its essentially practical value.

The book consists of the course of 20 lectures given at the Liverpool School of Tropical Medicine, and covers a very extensive field. It is a very much larger book than would be required strictly speaking for the student for the Diploma in Tropical Medicine, but in this respect we agree with the remarks made by the authors in their preface. If a textbook is to be of value to a student for that Diploma, it should also be of value to him after he has taken the Diploma, and when he proceeds to set out on original work in the field. "On the whole" writes Prof. Newstead in a foreword, "the work seems to tell us all, or almost all, which we shall ever need to know of the biology of the Arthropoda, and how much more than we can ever hope to remember. All that is needed is the teachers' own expiation and anecdote to give the lectures a personal touch. Special features which impart distinction to the book are the numerous artistic illustrations with which

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it is adorned; and the very useful summaries for the student's guidance throughout its descriptive pages."

The book has been written mainly and in the first place for the medical officer approaching the subject for the first time; the essentials—the ground work of the subject, so to speak—occupy an initial section of 150 pp., and this section will prove invaluable to those who are beginning its study.

It is interesting to find that the authors prefer to adhere to familiar and well established names of insects of medical importance. Here we confess that we sympathise with them; the medical sciences of entomology, helminthology, and protozoology at present are suffering badly from the tyranny of the "law of priority." Is it not almost time that another Linnean period was called, and that we got down to stability in this matter? A Stegomyia will bite just as voraciously, by whatever name she is called.

The best feature of the book is its simply splendid illustrations, most of them by Mrs. Patton, and every one of them admirably executed and admirably reproduced by the publishers. This is work of the very highest scientific order and value; the photographs by Miss M. Brown are also entirely admirable. Authors, publishers, and readers alike are to be congratulated on the wealth of correct and accurate illustration in the book.

There are certain criticisms, however, which we feel compelled to make. The absence of any list of contents and illustrations at the beginning of the book is apt to worry the reader. The authors have solved the question of a bibliography by omitting one; this certainly reduces the size—and price—of the book, and the D. T. M. student certainly does not require a bibliography. On the other hand we consider that the isolated worker in the field does, in order that he may write to the library of the base laboratory on which his enquiry is based for the literature on the subject which he is investigating. However, the question of whether to include or not include a bibliography is a debatable point.

The book has been produced by the authors themselves; and it is amazing that its price is so low—20s. post paid. Owing to the very authoritative position of the authors in their science, the book at once assumes a great importance in the field of tropical medicine. A copy of it should be in every medical laboratory in the tropics, for it will be constantly required for consultation by laboratory workers, field entomologists and malariologists.

R. K.

ANNALS OF THE PICKETT-THOMSON RESEARCH LABORATORY. VOLUME V. THE PATHOGENIC STREPTOCOCCI: THEIR ROLE IN HUMAN AND ANIMAL DISEASE.—London: Baillière, Tindall and Cox, 1929. Pp. xi plus 376, with 46 plates. Price, 42s. net per volume.

THE whole of the fifth volume of these annals is again devoted to that almost inexhaustible subject, the streptococci. The three monographs which are included in the volume are on the rôle of the streptococci, respectively, in oral and dental sepsis, in tonsillitis and pharyngitis, and in puerperal sepsis and septic abortion.

Even if one is not entirely convinced of the value of the photographic method of identification, at least one cannot help admiring the most excellent photomicrographs which accompany each memorandum in the volume. The severest critics of this method—and we gather that there are not a few—will, we feel sure, admit that, if this is the *raison d'être* of the foundation and endowment of this laboratory, it is a good enough stick with which to beat the streptococcus.

The authors have carried out original and important work in each of the lines with which the memoranda deals and report their work therein, but these memoranda are much more valuable as summaries of their various subjects, and the extensive bibliographies which they contain will form valuable references for all time.

L. E. N.

A TEXTBOOK OF PRACTICAL THERAPEUTICS.—By H. A. Hare, B.Sc., M.D., LL.D. Twenty-first Edition. Enlarged. Thoroughly revised and largely rewritten. London: Henry Kimpton, 1930. Pp. x plus 1104. Illustrated with 145 engravings and 6 plates. Price, 36s. net.

A TEXTBOOK that has reached its twenty-first edition moves by its own momentum and requires little attention at the hands of the reviewer. Hobart Amory Hare's *Textbook of Practical Therapeutics* has led the field in that particular division of medicine since its first appearance. The present edition is enlarged, completely revised and largely re-written; it forms a lasting monument to the energy, ability and practical application of the author. The book is divided into four parts. Part I deals with general therapeutic measures, with the modes of administering drugs, with the indications and contra-indications for them, and with prescription writing. Part II deals in alphabetical order with drugs—the physiological action, the therapeutic action, and the method of administration. Numerous prescriptions of real practical value are introduced in this section and provide a most valuable formulary. The diuretic action of ammonium chloride in renal dropsy is discussed and also the little known use of the same drug in *B. coli* pyelitis. In the latter condition it both increases the acidity of the urine and is directly destructive to the colon bacillus.

In discussing dextrose the author calls attention to the almost universal confusion of dextrose and glucose. Dextrose represents complete starch hydrolysis, whereas glucose represents partially hydrolised starch and contains maltose, dextrin and water. When given intravenously, intramuscularly or intra-abdominally, dextrose should always be employed. When taken by mouth dextrose is generally better too.

Part III describes remedial measures, other than drugs, and foods for the sick.

Part IV gives the treatment of diseases, which are arranged in alphabetical order.

A useful index of diseases and remedies completes the volume.

The book is of outstanding merit and is complete and authoritative. It contains five beautifully coloured plates, besides a large number of illustrations and diagrams.

J. D. S.

A COMPILATION OF CULTURE MEDIA FOR THE CULTIVATION OF MICRO-ORGANISMS.—By Max Levine, Ph.D., and H. W. Schoenlein, M.S. London: Baillière, Tindall and Cox, 1930. Pp. xxi plus 969. Price, 67s. 6d. net.

THE young and actively growing science of bacteriology, which depends so much on suitable media for its progress, has led to many thousands of combinations of material to be used as media for the cultivation of micro-organisms. The authors have made an exhaustive search of the literature and have gathered together in one volume a great deal of information of great value to every research worker. There are formulæ for about 7,000 media, together with notes on their many variants that have been advocated from time to time. The classification into groups, the four excellent indexes, the media name index, the constituent index, the author index and the use index, enable the worker quickly and without trouble to find the required information. A useful bibliography is given at the end.

This work, besides furnishing an excellent historical record of the many thousands of media tried, will be found useful in finding the best media available for the growth of any particular micro-organism. We hope that it will be found possible to re-test carefully the various media and to those found satisfactory to give prominence in the use index. For example under the heading colon-typhoid group there are 283 references, for tuberculosis 118, and for cholera 87 references. Many of these are of a purely historical interest and we would have wished that the more important ones had been in bolder type.

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(Full Report can be read in "The Lancet," 22nd February, 1930, p. 414.)

1. Determination of the Rideal-Walker coefficient of Dimol using organisms isolated from the fæces. (*See* Table I.)
2. Determination of the degree of dilution of the antiseptic leading to death of organisms in 15 mins. (*See* Table II.)

Test Organism.	TABLE I.—R-W coefficient (number of times Dimol more powerful than pure phenol).	TABLE II.—Degree of dilution leading to death of organisms in 15 mins.
B. typhosus	37	1:6500
B. dysenteriae (Shiga)	34	1:6250
B. dysenteriae (Flexner)	34	1:6000
Streptococcus faecalis	24	1:5500
,, pyogenes	27	1:6000
,, haemolyticus	28	1:6000
Pneumococci	32	1:7000
B. faecalis alkaligenes	30	1:6000
B. coli	30	1:5000

3. *Examination for toxicity.*—Single doses up to 0·02 g. (equivalent to 1/3 gr.) per kilogramme body-weight were given to rabbits without producing toxic effects. Such a dose corresponds to grs. 20 for a man weighing 10 stone, five times the dose advocated for therapy. No evidence of absorption as shown by carboluria was obtained. Repeated doses equivalent to two and a half times those recommended in therapy also failed to produce ill-effects when given three times daily over a period of four weeks.

CONCLUSIONS

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Comprehensive and almost complete at the time of its compilation, a book of this nature must require constant additions, and already there are many new media that have been brought into use, and the future will bring additional information and new features which would require the production of additional volumes to keep the work up to date. We hope that this good work begun by the Department of Bacteriology at the Iowa State College at the request of the Society of American Bacteriologists will be continued, and we look forward to further compilations of this nature.

We congratulate the authors on the production of this most valuable book, and for the first time the "kitchen" of the bacteriologist has been provided with its most essential "Mrs. Beeton" in the shape of this compendium of information. We commend it very highly to every research worker.

C. L. P.

HUMAN PHYSIOLOGY.—By F. R. Winton, M.D., and L. E. Bayliss, Ph.D. London: J. & A. Churchill, 1930. Pp. xiv plus 533, with 227 illustrations. Price, 15s. net.

ACCORDING to a well-known authority, the fully qualified practitioner should be one who has studied physiology after, as well as before, his study of pathology and medicine. In Scotland the old name for physiology was *institutes of medicine*. Medicine can only find a sure foundation on a sound knowledge of physiology. This book—*Human Physiology* by Winton and Bayliss—is just the type of book which will enable busy practitioners to keep abreast of recent advances in physiology and so comply with the above precept. The newer knowledge gained by means of biochemistry and experimental mammalian physiology is embodied in this book which gives succinctly the views prevailing among laboratory workers at the present time.

Histology, the history of physiology and its classical experiments—such as *the rheoscopic frog*—find no place in this book. The order in which the subject is treated is also different from that found in ordinary textbooks of physiology. The book therefore does not wholly meet the requirements of students preparing for examinations in physiology, but it will undoubtedly be of great use to such students to read in conjunction with a good textbook of physiology, as it lays emphasis on those aspects of the subject which will be of importance to them in their later studies and in the practice of their profession.

There are 227 illustrations, a very good index extending to 32 pages, and a bibliography (separate for each chapter) to help the reader who wishes to probe further into any particular topic. The printing is all that one could desire.

The book therefore, is one that can be confidently recommended to senior students of physiology and especially to senior medical students and practitioners who wish to refresh their memories and to obtain the most recent views held by specialists employed in physiological laboratories.

A. C. MACG.

SICK CHILDREN.—By Donald Paterson, M.D. (Edin.), F.R.C.P. (Lond.). London: Cassell and Company, Limited, 1930. Pp. 338, with 16 half-tone plates and 85 figures in the text. Price, 16s. net.

A BOOK by the part author of *Modern Methods of Feeding in Infancy and Childhood* will be received with interest, and those who have read that book will not be disappointed in the author's new production.

The book covers a wide field, surprisingly wide considering its size; not only are the commoner diseases dealt with but rarer conditions which occasionally crop up in general practice are dealt with in such a manner as to minimise the difficulty of their recognition. Disorders, not amounting to disease, as for example anorexia, dietetic obesity, and faulty posture are dealt with briefly and a definite line of treatment is suggested.

The illustrations are one of the main features and form a really striking collection; the author was to be seen some ten years ago haunting the wards and out-patient department of the Great Ormond Street Hospital for sick children, camera in hand, and the quality of the photographs now presented testifies to the fact that his vigilance in this direction has not relaxed since. It is impossible to overestimate the value of good illustrations; they render possible the reduction of the letter-press to a minimum and convey to the mind of the reader an impression more clear than would columns of description. The author has adopted a concise and definite style, and in doing so has managed to offer an amount of information usually to be found in a volume of twice the size. The student or practitioner searching for information on those diseases exclusively or mainly affecting children will find the diagnostic points and latest approved lines of treatment clearly summarised for his benefit.

The book opens with a chapter on the examination of sick children, which includes the interpretation of symptoms and useful figures regarding normal weight, measurement and progress on which the diagnosis of minor departures from health must depend.

The care of the premature child is fully discussed and the author raises a point which will be of interest to obstetricians, viz., that owing to the poor formation of the cerebral vessels and the general tendency to hæmorrhage, premature children, in spite of the usually easy labour, are especially liable to cerebral injury at birth.

Pages 65–69, giving the contents of all the better-known milk and malted foods, will be of value to practitioners, and of special interest to practitioners in this country will be the statement that the only objection to dried milk foods, properly used in the feeding of infants, is the expense.

The usual tables for the artificial feeding of infants are not given, but in their stead the author has suggested methods of estimation of requirements on the basis of 1½ oz. of cow's milk, sugar ½ drachm, and water 2½ oz., for each pound weight of the infant, and half a teaspoonful of cod-liver oil emulsion three times a day. This is a suitable feed for temperate climates and with due modification may form a sound standard for India. For children from the age of mixed feeding up to and inclusive of the school age, diet sheets are provided in full. The anti-ketogenic diet in fevers, outlined on pp. 415–416 should receive attention, as also should page 469 on the factors which influence the available sugar in the diabetic.

There must be points where all do not agree, for instance in the matter of the value of serum in diphtheritic paralysis and in nasal diphtheria; in the former we have had excellent results even in cases seen late and our experience of nasal diphtheria is that not only the local but also the general condition reacts favourably and rapidly to comparatively small doses, 8,000—12,000 units. Again, in the subject of acute osteomyelitis, the pediatrician in this country, far from regarding the condition as a rarity, keeps the possibility constantly in mind.

To sum up, the book is excellent and is to be recommended strongly to the student and practitioner.

E. H. V. H.

THE NERVOUS CHILD.—By H. C. Cameron, M.D., F.R.C.P. Oxford University Press. Price, 7s. 6d.

IN his preface to the first edition of this book, the author very cogently observes that in view of the increasing tendency to emphasise the importance of Preventive Medicine, the study of infancy and childhood claims a corresponding prominence. The book opens with a dissertation on doctors, mothers and children. The author emphasises how often quite intelligent and cultured mothers who have nothing to learn about a child's diet, exercise, fresh air and so forth, are quite unaware of what goes to constitute the mental welfare of a child. "Airy nurseries," writes Dr. Cameron, "big gardens, visits to the seaside, and every advantage that money can buy cannot achieve success if the child's mind is not at rest, if his sleep

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is broken, if food is habitually refused or vomited, or if to leave him alone in the nursery for a moment is to evoke a fit of passionate crying." To-day only very exceptionally do parents realise that broken sleep, absence of appetite and persistent refusal of food, irritability and excessive emotional display are indications in a child that the mind is not at rest. Still less perhaps do they realise that the growth of the mental functions of a child is so rapid as to preclude the existence of that stability of mind which characterises the mind of the adult. The instability of the mind of the child is an essential to its development; without such instability no mental development would be possible. As Dr. Cameron observes, in the little life which the child leads, a life in which the whole seems to us to be comprised in dressing and undressing, washing, walking, eating, sleeping and playing, it is not easy to detect where the elements of nervous overstrain lie. Nor is it as a rule in these things that the mischief is to be found. It is in the personality of the mother or the nurse. Dr. Cameron concludes this chapter with a timely warning to doctors to the effect that if a doctor is to fit himself to give advice about children he must be a close observer of little children and not consider it beneath his dignity to study nursery life and nursery ways. In the nursery he will find the growing point, as it were, of future mental disorders. In his discussion of the nervous significance of loss of appetite and want of sleep for the child, Dr. Cameron has a great deal to say that is of great interest and much practical importance to doctors, mothers and nurses. To the subject of bed-wetting in children Dr. Cameron devotes a whole chapter, for it is a matter which promotes endless distress to parents as well as to the unhappy little bed-wetters themselves. On the important subject of weaning children some authorities might be justified in maintaining that Dr. Cameron has not written enough, and in the chapter devoted to the education of children in sexual knowledge, it is evident that Dr. Cameron holds views with which very few persons who have had serious experience in this aspect of child life, could possibly agree. For example, Dr. Cameron appears to doubt very much that a child can be actuated by feelings of jealousy to the extent of disliking a new addition to the family. No one who has had much to do with children could deny for a moment that many children become intensely jealous of the latest born child, up to the point of wishing to injure or even destroy the newly arrived little brother or sister. One does not need to be a psycho-analyst to understand that a "fondness for the baby" in a child may act as a cloak for an implacable hatred. Dr. Cameron is obviously an opponent of psycho-analysis. It is equally obvious that he does not understand it. It is a great pity that in such an admirable book there should be no bibliography of modern literature on children. The names of such well-known writers as Stern, Piaget, Homer Lane, A. S. Neill, Susan Isaacs do not even occur. In such case it is hardly surprising to find that readers are not given references to works on the psychopathology of children published by professed psychoanalysts like Melanie Klein, O. Pfister and M. N. Searl. In spite however of these defects the book is a very valuable one and could easily, would the author only adopt a broader standpoint for the treatment of his subject, form the basis of a veritable classic.

O. B.-H.

THE STUDENT'S HANDBOOK OF SURGICAL OPERATIONS.—By Sir Frederick Treves, Bart., G.C.V.O., C.B., LL.D., F.R.C.S. Fifth Edition. Revised by C. P. G. Wakeley, F.R.C.S. (Eng.), F.R.S. (Edin.). London: Cassell and Company, Limited, 1930. Pp. xi plus 535, with 190 illustrations. Price, 10s. 6d. net.

THE fifth edition of the famous handbook is really a decided improvement on the former edition. The book is practically re-written in some parts, making the whole very lucid and pleasing reading. The diagrams are graphic and will help students to grasp the operations much more easily. This book can safely be recommended to young beginners as well as to the veteran for reference. Students will be much benefited by the chapter on "Radium and its use in the treatment of cancer." Without going into too minute details it will give the students a fair idea of the use of this remedy. We can safely recommend this book to students and practitioners alike as one of the best book on the subject comprising a compact mass of information.

T. A.

LANDMARKS AND SURFACE MARKINGS OF THE HUMAN BODY.—By L. B. Rawling, M.B., B.C. (Cantab.), F.R.C.S. Seventh Edition. London: H. K. Lewis & Co., Ltd., 1929. Pp. viii plus 98, with 36 illustrations. Price, 7s. 6d. net.

THIS is the seventh edition of a book which is familiar to candidates for the higher examinations in the last thirty years. Landmarks and surface markings of necessity do not change much, and the chief changes in this edition are in the improvement in the illustrations, when compared with the second edition.

It is still the most compact and accurate of textbooks on surface markings and one which no surgeon or examination candidate can afford to be without.

A. H. P.

PSYCHOPATHOLOGY.—By J. Ernest Nicole, L.M.S.S.A., D.P.M.R.C.P. & S. London: Baillière, Tindall and Cox, 1930. Pp. xii plus 203. Price, 10s. 6d.

No reader of this book will disagree with the opinion expressed by Dr. Stoddart in the preface which he has written for it, that Dr. Nicole has made a most important contribution to current literature on psychopathology. There is only one possible defect in the book and that is, as Dr. Stoddart observes, it might give rise to intellectual dyspepsia in all but the mentally eupeptic by reason of the quantity of information which it contains in so small a compass. Dr. Nicole has a gift for clear exposition so that his penetrating criticisms of the various schools of modern psychology and psychopathology are at times so brilliant as to be positively dazzling. Dr. Nicole has avoided the all too common error of trying to combine the often irreconcilable differences which exist, for instance, between the psychoanalytical approach, on the one hand, and the endocrinological or behaviouristic, on the other. Most psychologists will agree with Dr. Nicole's view that what psychology stands so sorely in need of to-day is some sort of Esperanto of psychological medicine, by means of which everybody would understand everybody else so that the terminological confusion which characterises psychiatry to-day, would either disappear entirely or be rendered less formidable. As an example of such confusion Dr. Nicole discusses the concepts of the "ego" current in psychiatry. The book is provided with an admirable bibliography and a good index.

O. B.-H.

CHEMISTRY OF FAMILIAR THINGS.—By S. S. Sadtler, S.B. Sixth Edition. Revised and Enlarged. London: J. B. Lippincott Company, 1930. Pp. XIII plus 342, with 23 illustrations and 6 figures in the text. Price, 15s. net. Obtainable from Butterworth and Co. (India), Ltd., Calcutta. Indian Price, Rs. 11-4.

THE author has presented much and varied scientific information in a non-technical manner. Starting with a brief outline of the principles of chemistry, he has gradually introduced other subjects which have direct or indirect applications of these principles. A variety of subjects, such as, the chemistry and production of light and heat, the chemistry of air and water, combustion, oxidation, sterilisation, the geology of the earth, the chemistry of the soil, the chemistry of the metals and their compounds, the chemistry of foods, the

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chemistry of the human body, have thus been introduced. The industrial applications, viz., the chemistry of soap, paints, paper, leather, rubber, glass, artificial silk, etc., have also been dealt with in a very popular way. People who are eager to learn about the mysteries of Nature and the modern scientific achievements of man will do well to read this handy volume written in a very popular style.

S. G.

THE CONJOINT FINALS.—By G. N. Beeston, M.R.C.S., L.R.C.P. Pp. 135. London: John Bale, Sons and Danielsson, 1930. Price, 6s.

THIS small book will be of interest to medical students preparing for their final examination, and to examiners also. It contains all the questions set in medicine, surgery, and midwifery in the M.R.C.S., L.R.C.P. combined "Conjoint finals" from 1911 to 1929, classified under the different systems and arranged in the date-order of their occurrence. A cursory examination of its contents leads us to the conclusion that the examiners at the Conjoint finals are rather ingenious at not repeating the same question twice. Even more interesting are the blank entries in the book; thus with regard to gynæcological instruments, the one and only question asked in twenty years was regarding the indications for and against the use of a Hodge pessary.

Even in the rôle of examiner, medical students always claim our sympathy, and we can cordially recommend this work to their notice.

CATALOGUE OF MEDICAL, DENTAL AND SCIENTIFIC BOOKS.—Published by E. & S. Livingstone, Edinburgh, 1930.

MESSRS. E. & S. LIVINGSTONE have a very sound position as medical publishers, and our reviewers must be familiar with the high standard of publication which their textbooks show; indeed the publishing activities of the firm—which was originally founded as a firm of booksellers in 1864—go back to a pleasant association with Robert Louis Stevenson. The present catalogue will be of interest to many of our readers. The Indian agents are, Messrs. Butterworth & Co., Messrs. Thacker, Spink & Co., and the Book Company, Calcutta.

CATALOGUE OF THE PUBLICATIONS OF BAILLIERE, TINDALL & COX IN MEDICINE AND SCIENCE, 1930.—Pp. XIV plus 65.

THIS catalogue will be of interest to all our readers, and especially to librarians in charge of medical and scientific libraries in India, who should certainly write for a copy of it. Messrs. Baillière, Tindall & Cox make a notable contribution to the progress of medicine and of the sciences in the succession of authoritative and extremely well published books which they issue year by year.

The catalogue is divided into four parts; medical, dental, and nursing; veterinary, foods and food inspection, botany and agriculture; science and miscellaneous; and periodicals and reports. It is well indexed.

MALE DISORDERS OF SEX.—By K. M. Walker, F.R.C.S. Pp. 191. London: Jonathan Cape, 1930. Price, 5s. net. Obtainable from Butterworth & Co. (India), Ltd. Price, Rs. 3-12.

THIS is an admirable book; the author has been Jacksonian Prizeman and Hunterian Professor of the Royal College of Surgeons, Lecturer in Venereal Diseases to St. Bartholomew's Hospital, and Surgeon in charge of genito-urinary cases at the Royal Northern Hospital and St. Paul's. He is therefore extremely well qualified to know what the general practitioner does not know (or has not been taught) on the subject. His style is clear and lucid, brief and to the point. His introduction is almost the most important part of the book, for he brings out clearly how intensely important are such disorders to the sufferer from the mental and psychological standpoint, whereas the medical profession regard disorders of sex as among the minor ailments, occupying a no-man's land between the neurologist and the genito-urinary surgeon. Lastly, the book is based on personal experience rather than on the enormous and often cloudy literature on the subject.

The subjects dealt with in turn are impotence, its causes and treatment, marital disorders, homosexuality, masturbation, pollutions, priapism, and continence, whilst the second part of the book deals with sterility in the male.

We would like especially to bring this brief and valuable book to the notice of the medical profession in India. Male disorders of sex are probably of even greater importance in medical practice in India than in Europe, and the writing is sane, balanced, and informative. The book is just what the general practitioner needs to supplement the ignorance of the subject with which his training as a medical student has left him.

R. K.

CONTRACEPTION, A COMMON CAUSE OF DISEASE. —By F. J. McCann, M.D., F.R.C.S. Pp. 29. London: John Bale, Sons & Danielsson. Price, 1s.

THIS is a reprint of an address delivered at a conference held in Paris in 1928, and is important because of the distinguished position which the author holds in the world of surgery and gynæcology. Ludovici, in his most fascinating book, *Woman—a Defence*,—a book which the male sex will chuckle over, but which will infuriate every female reader—propounds the proposition that coitus completely satisfies the male, but not the female partner. Her sexual pleasure only commences with coitus, and requires the complete cycle of pregnancy, birth, and lactation to satisfy her natural appetites. To deprive her of regular pregnancies is to do her the gravest wrong. He then proceeds to dilate upon the commonest failings of the female sex, which he attributes to sex characteristics, the chief of which he considers to be a natural inability to either see or tell the truth.

Dr. McCann is clearly of Ludovici's opinion. His address is popular in style and therefore we can hardly expect it to include scientific evidence. That certain contraceptives are injurious is undoubtedly a fact—the wish-bone pessary has even been found imbedded in a placenta, but when he states dogmatically that "there is then clinical evidence and experimental evidence to prove that continued contraception hinders and may ultimately destroy the egg-producing power of the ovaries and the egg-bearing power of the uterus," he brings forward no single particle of evidence of any sort, other than a vague general clinical impression, in support of his statement. He then proceeds further to state that fibroids, cancer of the body of the uterus, and ovarian tumours may result from the use of contraceptives. He even raises the question as to whether the wholesale use of contraceptives may not lead in time to the birth of a generation of women congenitally incapable of reproduction.

Dr. McCann's address is of interest, but he deals with an extremely important subject, and we confess that we should like to see the scientific evidence upon which his thesis is based. (Perhaps he has published it elsewhere.)

R. K.

REPORT ON THE STUDY OF COMPARATIVE MORTALITY FIGURES OF MAJOR MUNICIPALITIES IN THE UNITED PROVINCES.—By Dr. B. S. Yajnik. Allahabad: Supdt., Govt. Printing, U. P., 1930. Price, Rs. 2-4.

THIS is an interesting report, dealing with conditions typical of urban areas in India, and showing that the towns of India are more unhealthy than is the rural country-side. It consists of an investigation into the mortality returns from 1921 to 1927 inclusive of the seven largest municipalities in the United Provinces, viz., Agra, Allahabad, Bareilly, Benares, Cawnpore, Lucknow and Meerut.

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Taking the average general mortality of the United Provinces at a figure of 1,000, the seven towns concerned give the following comparative rates:—

Agra	1,713
Allahabad	1,223
Bareilly	823
Benares	2,005
Cawnpore	1,953
Lucknow	1,453
Meerut	983

The reason for the excess mortality in five of these towns is next discussed. The Agra figure is high, chiefly on account of epidemic plague in 1926. Benares (as one would expect) shows a very high death rate due to diarrhœa and dysentery. Cawnpore is the most overcrowded and commercialised of the seven cities, and shows the appalling infant mortality rate of 461 per mille. Lucknow shows very high figures for infant mortality (286), and for deaths from respiratory diseases. Agra records a high death rate from respiratory diseases—12.16 per mille.

Interesting general figures are those for the maternal mortality in childbirth—a rate of 8 per 1,000 births, or just more than double the corresponding figure of 3.81 for the United Kingdom. The female death rate from all causes is about 6 to 8 per mille more than the male death rate, the chief excess for the former being under the headings fevers, respiratory diseases, and pulmonary tuberculosis.

Dr. Yajnik's studies will be of interest to all public health workers in India.

PHYSICAL DIAGNOSIS.—By Richard C. Cabot, M.D. Tenth Edition. London: Baillière, Tindall and Cox, 1930. Pp. XXI plus 529, with 6 plates and 279 figures in the text. Price, 25s. net.

THE reputation established by former editions of Gabot's Physical Diagnosis is such as to make further comment on the work almost superfluous. The tenth edition is a model of clear exposition, concise reasoning and accurate information. Dr. Cabot has only described what he has found, by prolonged use, to be of value. He has combined essential clinical and laboratory procedure and has broken down what he considers to be the false distinction between the so-called "clinical" and "laboratory" methods of diagnosis. The book is the best of its kind that we know, and for use in connection with bedside work should be invaluable to student and practitioner alike. There are nearly three hundred excellent illustrations, including photographs, reproductions of *X*-ray films and diagrams. These add greatly to the value of the book.

A considerable amount of material in connection with coronary disease, electro-cardiography, cancer of the lung, cardiac asthma, toxic hepatitis and encephalitis lethargica has been added in this edition. Reference is made to the Gamble-Cabot cardiac diagnosis records which have been put on the market by the Columbia Phonograph Company of New York—a new departure in the teaching of medicine. Records are available to illustrate and exemplify coupling of the heart beats such as occurs in digitalis saturation, functional murmurs and the murmurs in mitral and aortic disease. The book is essentially one to have and to use. It is of outstanding merit and can be strongly recommended.

J. D. S.

A TEXTBOOK ON ORTHOPÆDIC SURGERY.—By Willis C. Campbell, M.D., F.A.C.S., Professor of Orthopædic Surgery, University of Tennessee, College of Medicine; Attending Orthopædic Surgeon, Baptist Memorial Hospital, etc. Pp. 705, with 504 illustrations. London and Philadelphia: W. B. Saunders Company, Ltd., 1930. Price, 37s. 6d.

THE scope of orthopædic surgery is much wider in the United States than is at present the case elsewhere. It covers the treatment of recent fractures and dislocations, besides most of the diseases of bones and joints which are usually considered to be the province of the general surgeon; to deal adequately with such a large field in a single volume of average size is naturally almost impossible. The author anticipates criticism by stating that the book is meant for students, general practitioners and surgeons, presumably general surgeons are meant and not those practising as orthopædic specialists. In consequence he gives the impression of being cramped for space and compelled to deal sketchily with much which he could have treated at greater length with advantage to the reader, whereas other subjects, which are evidently of special interest to the author, arthroplasty and syphilis of the bones and joints, for instance, receive disproportionate space. Still in spite of this inequality the book gives a very good survey of the present position of orthopædic surgery. The opening chapters on the examination of cases and the construction of orthopædic apparatus are admirable and worthy of careful study by all who have to deal only occasionally with these cases. Acute infectious arthritis of joints is then taken up and detailed instructions are given for aspiration and drainage of individual joints. Under the heading "low grade infections of joints" are grouped not only rheumatoid and osteo-arthritis, but also syphilis, tuberculosis and the obscure group of diseases which includes Köhler's disease, coxa plana, Osgood-Schlatter disease and others. The accounts of all these conditions though brief, are adequate, but it is surprising to find that gonorrhœal arthritis is almost ignored, whilst syphilis of the joints is allotted four pages. The value of helio-therapy in joint tuberculosis is stressed and methods of employing it are considered in detail, but on the whole the non-operative treatment receives scant notice compared with the detailed directions which are given for the performance of the various operations for the production of fusion of the joints, both the older procedures and the more modern methods of extra-articular arthrodesis. Although he is careful to emphasise that these methods must be regarded as adjuncts to other treatment rather than as curative measures, it is evident that Dr. Campbell belongs to the advanced American school of thought, which advocates operation even in children, by reason of the length of time necessary for successful results by other methods of treatment. In India joint tuberculosis is fortunately comparatively rare, but the results of conservative treatment are so very bad, owing to the lack of sanatorium accommodation that better end-results would probably be obtained by bolder surgical treatment on the lines now being followed in America. Arthroplasty is advocated for most cases of ankylosis in adults and we find detailed accounts of the operations for each joint; in India its scope is much more limited, on account of the prolonged and painful after-treatment, co-operation in which on the part of the patient is essential.

The chapters on fractures and dislocations are necessarily brief, but the treatment advised is entirely on modern lines. The author has evidently had exceptional opportunities for the study of syphilis of bones, which is said to be very common amongst the Negroes of the Southern States, for there are seven pages devoted to this subject as against one short paragraph on tuberculosis, the descriptions of the pathology and radiographic appearances are exceptionally lucid and should be of great help to the student. The chapter on bone tumours follows the classification introduced by the Sarcoma Registry of the American College of Surgeons and is on modern lines. Bursitis is an important disease, but one would not have supposed it to be so common as to merit the allotment of thirteen pages which it receives. The rest of the book deals with deformities, the result of diseases of the nervous system and static deformities on the usual lines.

In spite of the inequalities pointed out, this book may be recommended as a sound guide to those commencing the study of this difficult subject. The printing and paper are of a high standard and the illustrations particularly of operations are well executed and helpful.

W. L. H.

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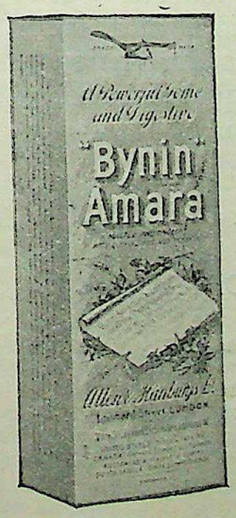

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Annual Reports.

ANNUAL STATEMENTS OF DISPENSARIES AND CHARITABLE INSTITUTIONS OF THE PUNJAB FOR THE YEAR 1929. BY COL. H. M. MACKENZIE, I.M.S., I.G.C.H., PUNJAB. LAHORE: SUPDT., GOVT. PRINTING, PUNJAB. PRICE, RS. 4-12.

ANNUAL STATEMENTS of provincial hospitals and dispensaries are apt to be documents that are very difficult to review; full of statistical tables, and very little else. The one under review, however, is a most notable exception. Its most prominent feature is a map of the Punjab showing the exceedingly numerous centres for medical relief of all types, from State hospitals and rural dispensaries to State-aided or non-aided private hospitals in the Province. It is a most wonderful map, for the whole of the vast province is everywhere studded with centres for medical relief. The only areas in any way blank are smaller Native States. The map affords a complete refutation to the arguments of those who claim that Government neglects the subject of medical relief in rural areas. And in the actual report itself the figures for medical relief throughout the Province are simply colossal.

The covering official Government letter to the report is in itself so admirable a review of this important report that we venture to quote it *in extenso*:—

The year 1929 has seen the scheme of providing rural dispensaries for every 100 square miles and every 30,000 of the population brought almost to completion, and the result undoubtedly seems to have justified expectations. Not only has the total number of patients in all classes of hospitals risen even since last year by nearly two million, but it appears that out of the total number of 10,617,138 out-patients treated in the Province, as many as 3,151,105 were treated in the the 317 rural dispensaries of the new type now working. Before these were opened a small portion of these patients might have travelled the 20 miles or more to bring them to hospitals or dispensaries elsewhere, but the ordinary peasant is notoriously averse to travelling far from his home in time of sickness and it may safely be assumed that the vast majority of these three million patients would have had no medical aid at all, if it had not been for the opening of these dispensaries. Government agree with the Inspector-General of Civil Hospitals that this is an achievement of which the medical administration of the Province may well be proud.

Another cause for satisfaction is to be found in the fact that this particular scheme has now been carried through in full. Although 58 dispensaries remained to be opened after the close of the year under review, the Inspector-General of Civil Hospitals notes that most of these had been started by the time his report was written. In the case, however, of the parallel scheme of improving the quality of medical relief dispensed by the district and *tahsil* hospitals throughout the Province by taking these under the direct control of Government, in which great progress was made in the year 1928-29, the present difficult condition of the provincial finances has imposed a serious check and has definitely slowed down the rate of progress. Except for the fact that no district headquarters hospital was taken over during 1929-30, the figures for this year do not reveal the extent to which in fact the brakes have been applied, but Government are constrained to record with regret that next year's report will show almost negligible progress and there seems little prospect in the immediate future of the scheme gathering increased momentum. However anxious the Ministry of Local Self-Government may be to press down the accelerator pedal no result can follow so long as the petrol tank is empty of the fuel of finance.

Solid progress, however, continues to be maintained in the work of the existing hospitals. The new rural dispensaries are largely responsible for the rise in the number of out-patients treated, but the rise of nearly 20,000 in the number of in-patients is due to the good work being done in the major hospitals of the province. The Mayo Hospital, Lahore and the Amritsar Civil Hospital have maintained their reputations for good work done, and continue, as is natural, to head the list of the number of in-patients treated. These are closely followed in numbers, if not in variety, of diseases treated, by the out-lying hospitals whose presiding officers have established a reputation for eye operations. No year passes without the work in this sphere of Rai Bahadur Dr. Mathra Das of Moga being mentioned in the report, and this year the growing reputation of Dr. Harbhajan Singh has attracted a large number of eye-patients to Gojra where he is now stationed. The sight of the roads and other open spaces surrounding the dispensary at Gojra during the season when eye operations are most frequently performed suggests that the term "indoor patients" is a misnomer.

Government have read with much interest of the success of Dr. McGuire, Civil Surgeon, Dharmsala, in interesting the people of this somewhat backward district in his scheme for establishing nurse dais in the dispensaries of the district. The public spirit shown by the gentlemen who have given or promised donations, and the response shown to the scheme by the inhabitants of various villages who have constructed quarters to enable dais to be posted to their dispensaries, are gratifying evidence that much can be accomplished where zeal and enthusiasm show the way, and Government desire to take this opportunity of thanking Lala Kidar Nath Gupta of Balrampur in the United Provinces, Rai Bahadur Chaudhri Mallah Singh of Indora, Mian Raghunath Singh, Dewan Bishan Das and the Raja of Guler for their generous gifts. Another generous gift of a particularly valuable nature which Government desire to acknowledge with gratitude is that of Dr. Burroughs and his brothers and sisters who have sent from England a sum of £1,300 (Rs. 16,133) in memory of their sister, to enable a radium treatment centre to be opened in the Mayo Hospital. This will be a valuable addition to the resources of the hospital which Government have for some time been anxious to inaugurate and it is hoped that a start will very shortly be made.

There is no sphere of medical relief more important than that connected with the provision of special facilities for the treatment of women, and in this direction Government note with pleasure that the past year is notable for conspicuous advance in two directions. In the first place the temporary maternity hospital in Lahore, opened to pave the way for the new maternity hospital near the Fort now nearing completion, has, under the enthusiastic guidance of Major Hayes, made great progress and proved that in the presence of a scientifically and sympathetically organised maternity hospital age-long prejudices are breaking down and women are ready to avail themselves of the comfort and security provided by such institutions. This success is a happy augury for the future of the permanent hospital now shortly to be opened in close proximity to the city. The second matter in which notable advance was achieved during the year under report was the final adoption of the scheme for constructing a new Lady Aitchison Hospital and women's medical school at Lahore, which is estimated to cost about Rs. 30 lakhs. The foundation stone was laid in January 1930 by Lady Hailey, who gave one more proof of her deep interest in all matters concerning the welfare of the women of the Punjab by making a special journey from the United Provinces for the purpose, and construction is now in progress.

The Inspector-General of Civil Hospitals has referred in his report to the decision of Government to postpone for the present the opening of new female sections attached to *tahsil* hospitals. In view of what has been said above Government are satisfied that this decision will not be interpreted as anything more than a pause to take stock of the results of the progress so far

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made, and to watch how far the progress made is progress on the right lines. Doubts have been expressed in certain quarters as to whether the womenfolk in outlying parts of the districts are sufficiently alive to their own interests to make regular use of female sections in the local dispensaries. In view of the rapidly mounting figures of women treated in all classes of hospitals and in view of the encouraging experience of the maternity hospital in Lahore already referred to, Government have no hesitation in believing that the experience of the female sections already opened will prove these doubts to be groundless and it is hoped that the provision of female sections in all hospitals provincialised will be proceeded with as fast as funds will permit.

Government feel that the time has come when it is necessary to find extra funds further to improve the existing hospitals, and in order to provide this money it seems desirable to find out if the well-to-do persons receiving treatment free in hospitals cannot be made to pay for the service rendered to them. While endeavouring to achieve this end, safeguards must be provided that any such new system of charging fees from the rich does not cause the poor to suffer or to be refused treatment. Government have arranged to consult the Standing Committee of the Legislative Council on this matter at an early date and hope that it will be possible to carry out a further investigation and achieve some definite result.

The expansion of medical relief has imposed additional duties on the medical officers of the Province. The Inspector-General of Civil Hospitals and his Deputy or Assistant Inspector-General have an ever-increasing field of work to supervise and the Civil Surgeons have an increasing number of dispensaries to inspect. Government are glad to note that the inspection work of the Civil Surgeons has not suffered and desire that the Inspector-General will convey to these officers the thanks of Government for the good work that is being done. To Lieut.-Col. Sodhi, who, during the year under report, concluded an arduous term of four years' duty at headquarters as the Inspector-General's Chief Lieutenant, the appreciation of Government is particularly due, an appreciation which it has been possible for Government to mark in a special manner since the close of the year under report by his selection for the important post of Civil Surgeon of Lahore. Khan Bahadur Mirza Asghar Ali, at the close of a long period of service in which he had established a reputation as a capable Civil Surgeon and reliable administrator, was called upon in his last year to fill the newly created post of Assistant Inspector-General and to take over the duties previously entrusted to the Deputy Inspector-General, and proved the value of the appointment by the large number of inspections of outlying dispensaries he was able to make. To Col. Mackenzie himself are due the thanks of Government for his administration of the department throughout the year, and for his instructive report.

Turning to the actual report itself, certain sections of it are of such special interest that we may abstract verbatim from Col. Mackenzie's report:—

The expenditure during the year amounted to Rs. 55,56,251, the closing balance carried forward to next year being Rs. 2,77,980; establishment charges rose from Rs. 23,77,554 to Rs. 26,26,536, the cost of European medicines from Rs. 6,78,230 to Rs. 7,09,471, bazar medicines from Rs. 41,918 to Rs. 45,406 and expenditure on diets from Rs. 2,02,044 to Rs. 2,22,436. Expenditure for the purchase of new apparatus and instruments amounted to Rs. 89,919 while miscellaneous charges amounted to Rs. 8,91,777. New buildings cost Rs. 6,80,538 as compared with Rs. 8,85,422 in 1928 while repairs to existing buildings account for an expenditure of Rs. 2,08,121.

Mayo Hospital, Lahore.—The Mayo Hospital, Lahore, has maintained its popularity both as the premier institution for the treatment of the sick and for providing efficient clinical material for the practical training of students of the King Edward Medical College, Lahore, to which it is attached. The total number of patients treated in the hospital during the year 1929 was 54,193 against 53,002 in the preceding year. The number of in-patients, however, fell from 7,622 in 1928 to 7,568 in the year under report on account of the closing down of some surgical beds for a couple of months during the summer of 1929 on account of shortage of nurses.

The death rate was 6.95 per cent. against 6.19 per cent. in the year 1928. The higher percentage in death rate is due to an increase in deaths from dysentery and pneumonia as many patients suffering from these two diseases came for admission in almost a moribund condition. There is an all-round increase in the number of operations performed, in the various departments of the hospital. The *X*-Ray and Electrical Department, and the Clinical Laboratory which play an important part for purposes of diagnosis continued to enjoy their well-deserved popularity. The year records a considerable increase over the figures of the preceding year. Owing to financial stringency, it was not possible to start radium treatment, but the proposals have matured and the centre will be established very soon. The radium treatment when provided, will fill a distinct need of the province as at present the only Radium Institute in India is at Patna in Bihar and Orissa and on account of the distance and expense very few, if any, people of this province can afford to avail themselves of this treatment.

A new tube-well has been completed and the water supply of the hospital, which was hitherto inadequate, is now sufficient for the needs of the hospital.

Temporary Maternity Hospital, Lahore.—This hospital has justified its existence both as regards the number of patients treated and students trained in practical midwifery. During the year 1929 all normal labour cases which sought admission to the Mayo Hospital were transferred to the Temporary Maternity Hospital and all maternity cases requiring operation were transferred from the latter institution to the Mayo Hospital. The experiment proved an unqualified success as actually 18 beds in each hospital remained in use for the major part of the year.

The progress on the maternity side has exceeded all estimates inasmuch as 215 cases were delivered in the hospital and on these 38 students were trained, the corresponding figures for the preceding year being 113 and 27 respectively. The hospital has made great progress and it is confidently hoped that after 3 years all students of the King Edward Medical College, Lahore, will be trained in practical midwifery in the institution. Great credit is due to Major S. N. Hayes, I.M.S., for the enthusiasm and keenness he has displayed in working up the hospital attendance. The New Maternity Hospital is ready with the exception of the Septic Block on which construction work is expected to be started shortly. The Administration Block, which provides accommodation for 12 in-patients, has been opened and the whole hospital will be occupied in October 1930 when the Temporary Maternity Hospital will cease to exist.

Civil Hospital, Amritsar.—The hospital continues to do useful work and enjoys a well-deserved popularity. The institution is known for the surgical work done there for many years past and forms an excellent training ground for the teaching of students of the Medical School, Amritsar, on the clinical and practical side. There is a steady increase in the work done at this hospital which indicates its growing popularity, so much so that the number of in-patients admitted exceeds the authorized number of beds. There is considerable overcrowding during the two eye seasons for which temporary accommodation has to be provided. The total number of in-patients treated at this hospital during the year 1929 was 6,874 showing an increase of 242 over the figures of the previous year. The hospital has hitherto suffered from the insufficiency of medical clinical material but it is gratifying to record that progress is being steadily made in this direction with the result that the number of medical cases rose from 696 in 1921 to 1,329 in 1929.

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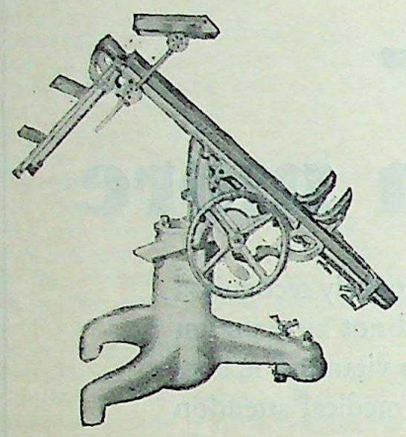

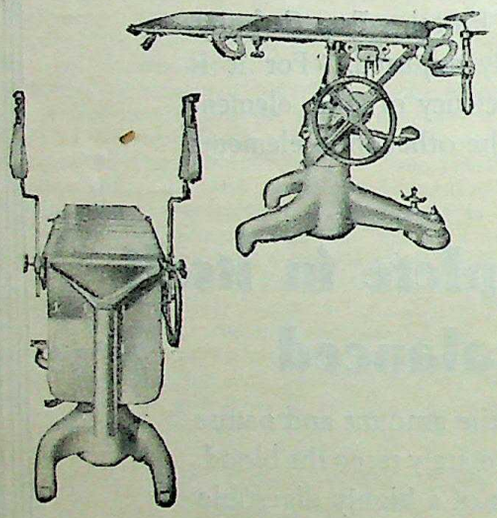

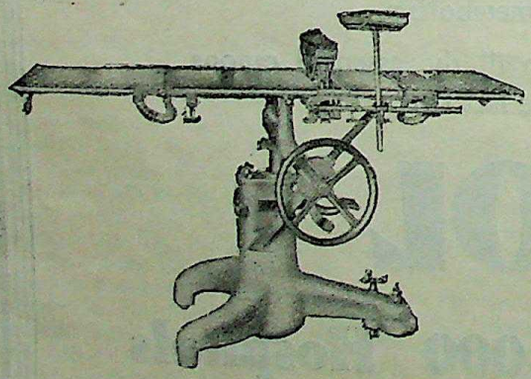

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Extensive additions and alterations are required to bring the hospital up to date. The temporary buildings of the Medical School, Amritsar, have been made over to the hospital and this will form a valuable annexe to the hospital after making certain structural alterations for use as an Eye Hospital. It will also provide accommodation for tubercular patients and maternity cases. The proposals to enlarge the hospital accommodation include additions and alterations to the surgical block, the construction of a new administrative block on its present site, *X*-Ray Department and Nurses Home. The work will be taken in hand as funds become available.

Ripon Hospital, Simla.—This is one of the most important hospitals in the province on account of Simla being the summer headquarters of the Government of India and the Punjab Government. The hospital is doing useful work but the scope for greater usefulness is very much curtailed for want of proper accommodation. The accommodation is insufficient for its present needs even during the winter months to say nothing of the summer season when there is a great influx of population. The question of providing extra accommodation is at present under consideration and it is hoped that the proposal will materialize before long. Of the 16,312 patients who were treated in this hospital, 1,316 were in-patients and 14,996 out-patients.

Dental Hospital, Lahore.—Owing to the delay occasioned in the recruitment of the staff, the Dental Hospital could not be opened during the year 1929. It was, however, opened by His Excellency the Governor on the 7th March, 1930, and started functioning from the 1st April.

Memorial Hospital, Ludhiana.—The hospital is exclusively reserved for women and children. It enjoys a provincial reputation in that it provides efficient treatment by women doctors in the various branches of medical science especially in gynæcological and obstetrical cases. It is attached to the Punjab Medical School for Women, Ludhiana, and, therefore, plays an important part in the training of female sub-assistant surgeons, dispensers, nurse dais and dais, etc. The hospital possesses an excellent ante-natal and children's department which is in fact a model of what it should be and is most efficiently run.

The hospital is maintained by the Church Missionary Society aided by grants received from Government and certain district boards and municipalities, etc. Owing to paucity of funds it suffers from certain deficiencies, some of which are the absence of an *X*-Ray plant, adequate water supply and electric lights and fans. The number of patients treated at this hospital was 3,082 in-door and 47,993 out-door.

Medical Inspection of School Children.—The scheme which is being tried as an experimental measure in certain selected districts since 1926 has not proved an unqualified success. The actual work of medical inspection is carried out by assistant surgeons and sub-assistant surgeons in addition to their legitimate duties and they are allowed an honorarium of Rs. 8 for every 100 scholars examined. The difficulties experienced in the working of the scheme are:—(1) owing to the inadequacy of the remuneration the medical examination is not carried out as carefully as was expected; (2) the dual control of the District Medical Officers of Health is resented by the Medical Officers in certain cases; (3) parents are lacking in co-operation. They do not care to send their boys to dispensaries for treatment even when these are situated at places where schools are located; and (4) the teachers are apathetic. They do not take proper interest in the working of the scheme.

The whole question is being examined again with a view to exploring avenues for the success of the scheme.

Female Medical Aid.—Steady progress is being made in the matter of provision of medical aid for women by female doctors. In pursuance of the scheme of expansion of female medical aid undertaken by Government, the female hospital at Dera Ghazi Khan was provincialized during the year 1929 in addition to 8 other hospitals, viz., at Taunsa, Karnal, Dipalpur, Leiah, Narowal, Fatehabad and Rupar where female sections exist or are to be provided. A woman assistant surgeon was working at Karnal before the hospital was provincialized and a woman sub-assistant surgeon was posted to Taunsa. The necessary female medical staff will be appointed to other hospitals when arrangements are complete. The provincialization of other female sections at tahsil headquarters hospitals has been postponed by Government for the present. The decision will naturally give a set back to the provision of medical aid for women by doctors of their own sex; but it is hoped that the scheme of providing separate female hospitals at district headquarters will now be pursued more vigorously. It was proposed to provide a separate female hospital at Gujrat but owing to financial stress no progress was made with the proposal during the year under report. In addition to the female hospitals mentioned above the Dewan Sarab Dyal Memorial Zenana Hospital at Dharmsala was completed during the year and a woman assistant surgeon has been placed in charge of it. It has made a good start and is being highly appreciated in the Kangra district which is one of the most backward districts in this respect. Another female hospital was opened at Panipat under the charge of a woman assistant surgeon. The Lady Hailey Hospital for Women and Children, Bhiwani, could not be opened before the close of the year 1929. It has however, been opened in 1930. The Josephine Female Hospital, Hazro, which owes its existence to the good offices of Mr. and Mrs. Garbett records another year of successful working. Doctor G. McGuire, Civil Surgeon, Kangra district, has collected subscriptions to the extent of Rs. 20,000 for the provision of female medical aid in that district and this is very creditable having regard to the fact that the people are admittedly poor, backward and orthodox. The District Board, Kangra, have sanctioned the appointment of 12 nurses and nurse dais and 10 candidates are under training at the Ludhiana School for this district. The establishment of a female hospital at Kulu and Indaura, is one of the immediate needs of the district. The nurse dais' scheme initiated by Dr. McGuire at Karnal is on the whole working satisfactorily. Some of the nurse dais are reported to be doing really excellent work while on the other hand some of them show a very poor record of work for the year. The Civil Surgeon attributes this to the lack of supervision of nurse dais' work and suggests the appointment of a whole time woman sub-assistant surgeon.

Female Medical Education.—The Women's Christian Medical College, with which is incorporated the Punjab Medical School for Women, Ludhiana, is at present the only institution in the Punjab on which the province depends for its supply of female sub-assistant surgeons and other staff. During the past 3 years progress in the education of girls is said to have been far more rapid and satisfactory than previously and this has been reflected in the increased number of girls seeking admission to the sub-assistant surgeon class at Ludhiana. The supply of female sub-assistant surgeons was almost equal to the demand and no hospital remained closed for want of a sub-assistant surgeon except the one at Sirsa where the municipal committee was unable to grant the increment due to the doctor who then resigned her appointment. The dearth of female dispensers continues and many hospitals are without one at present and are carrying on with a male dispenser as a makeshift arrangement.

I should like to add a word of praise in favour of Doctor Edith Brown, M.D., Principal of the Punjab Medical School for Women, Ludhiana, and her associates who were pioneers in the great cause of medical relief to women and who, by their untiring efforts, have made possible a steady flow of trained women doctors, nurses and midwives to minister to the medical needs of women of the province.

The most encouraging sign of advance, however, is furnished by the progress made in the training of nurse dais and dais. In 1929, 61 nurse dais and 92 indigenous

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dais passed their respective qualifying test against 49 and 75 in the preceding year. Some of the local bodies are showing great enthusiasm in sanctioning nurse dais and dais for hospitals and dispensaries maintained by them, for instance the names of District Boards of Rohtak and Dharmsala and Karnal are worthy of special mention in this connection.

The establishment of the Punjab Medical School for Women at Lahore, whose foundation stone was laid by Lady Hailey early in 1930, will solve the problem of female medical education and aid in the province.

Antirabic treatment.—The antirabic treatment centre at the Provincial Bacteriological Laboratory at Lahore, administered antirabic treatment to 2,396 patients during the year under review and the number of deaths reported was only two. This low death rate is to some extent discounted by the fact that all cases of face and finger bites and of deep, extensive and multiple bites on other parts of the body were sent to Kasauli for special intensive treatment.

SIXTY-SECOND ANNUAL REPORT OF THE DIRECTOR OF PUBLIC HEALTH OF THE UNITED PROVINCES OF AGRA AND OUDH FOR THE YEAR ENDING DECEMBER 31ST, 1929, AND THE THIRTY-FIFTH REPORT OF THE SUPERINTENDING ENGINEER, PUBLIC HEALTH DEPARTMENT, FOR THE YEAR ENDING MARCH 31ST, 1930. ALLLAHABAD: SUPERINTENDENT, GOVERNMENT PRESS, UNITED PROVINCES, 1930. PRICE, RS. 3-8.

THE United Provinces occupy an intermediate position in India geographically and climatically. They have more large towns than any other Indian province. There is therefore a great diversity of conditions of health and disease. Financially too the Provinces are better off than many others, and can afford to be progressive. In many respects therefore the Annual Health Reports are interesting to many public health workers outside the Provinces themselves. The 1929 Report is no exception.

The area of the province is 107,167 square miles and the 1921 population 45,375,787. The birth rate for 1929 was 34.33, being considerably below 1928 and 5 years mean. The death rate was 24.26, being practically the same as 1928. The reduced birth rate is ascribed to bad economic conditions. The infantile mortality recorded in 1929 was 168.61.

Births.—In 1929 births exceeded deaths by 457,042 or 10.07 per 1,000 of the population. Some towns record very high birth rates, e.g., Jalesar 72.28, Agra 69.25, Jhansi 65.74. On the other hand Naini Tal, and Mussoorie record low birth rates 12.26 and 13.37.

Deaths.—Lucknow recorded a very high death rate of 75.81 and Benares 63.93. In these towns small-pox and cholera and fevers were the main causes of these high mortalities. Naini Tal and Mussoorie recorded very low death rates 19.7 and 10.97.

The highest mortality occurs in May and the lowest in February.

Infantile mortality.—The infantile mortality rate has steadily decreased since 1908 when it was about 340 per 1,000 births. The 1929 rate is higher than the two previous years, but it was lower than in other years. The report states that there is only one co-operative dairy in existence in the whole province and this works at a loss.

In towns the infantile mortality rate was high, being 280. Lucknow returns the enormous rate of 470, a tremendous waste of energy and life. Cawnpore has a rate of 420. Fevers, pneumonia, exhaustion and malnutrition are held to be chiefly responsible for the high rates. Gorakhpur on the other hand records a rate of 69.60.

Chief diseases.—Compared with 1928 cholera, small-pox, fevers, and dysentery and diarrhœa had increased, but on comparing with the decennial average "fevers" and "all causes" showed a very distinct reduction.

Cholera.—In 1929 cholera killed 50,294 persons in the U. P., a ratio of 1.12 per 1,000. The highest mortality occurred in August and the lowest in February. Pilibhit, Ghazipur, Ballia and Fyzabad returned the highest mortalities. Etawah had the lowest death rate from cholera. Potassium permanganate, kaoline, and essential oils mixtures are the main weapons used in the U. P. in cholera epidemics. These are stocked at district head-quarters; special regulations under the Epidemic Diseases Act of 1897 are applied in rural areas from time to time. Over 93,000 inoculations against cholera were carried out. In order to prevent the importation of cholera on the occasion of certain fairs, medical inspection of passengers at various stations was instituted. At the inspection stations segregation hospitals were erected.

Small-pox.—11,725 deaths were reported. There are no regular small-pox hospitals in the province. The highest number of deaths occurred in May and the fewest in October.

Plague.—37,678 deaths from plague occurred, as against 80,943 in 1928.

Fevers claimed 810,538 deaths; 711,134 were due to malaria, 77,424 from other fevers, 8,540 from enteric fever and 292 from kala-azar, and 347 from relapsing fever.

Tuberculosis is now notifiable, but no figures are apparently available yet as the result of this measure.

Dysentery and diarrhœa.—14,865 deaths occurred from these causes. Garhwal returned the highest death rate. The rural areas return much higher figures than towns.

Respiratory diseases.—33,542 deaths were returned under this heading.

From a special enquiry it was deduced that deaths from dysentery, kala-azar and pneumonia were under reported, while those from malaria, small-pox, plague and relapsing fever were over-reported.

Vaccination.—During the year, 1,619,582 persons were vaccinated at a cost of 4 annas, 3 pies per head.

No case of encephalitis following vaccination was reported.

Water supplies.—Most municipalities have water supplies which give about 30 gallons per head per day to the population served.

The malaria branch gives an interesting record of work. The anti-malarial work on the Sarda Canal Zone was continued throughout the year; jungle clearing, fumigation, Paris-greening are the main methods of dealing with malaria. An interesting detailed report of the anti-malarial work in connection with the construction of the Sarda Canal has been published and should be consulted by all workers in malaria.

There was a sharp outbreak of epidemic malaria in Lucknow during the summer months. The fever rise started in March, reached the peak in May, declined in June, rose again in July and August and finally declined in September. *A. culicifacies* and *stephensi* were held to be responsible for the outbreak. The epidemic was apparently an exacerbation of the usual spring rise of March and April; 61.9 per cent. of 1,519 blood slides examined showed parasites. An epidemic outbreak associated with high mortality is unusual at this time of the year.

Various anti-malarial remedies were tried by the department—*kwera* bark, *kurchi*, alumen, and other indigenous drugs—none had any marked effect on the fever or the parasites.

Cinchona cultivation has been started and is progressing.

Clover cultivation is also being tried but no opinion is expressed. Paris-green would appear to be of limited applicability in rural areas.

An attempt is being made to distribute quinine to school children and villagers through mukhias, teachers, zemindars, etc. The effects are not yet reported, but the schemes are popular; adults get 30 grains of cinchona per day for three days at least and relapses are similarly treated. A noticeable improvement in spleen rates during the last three years is reported.

Plague.—The epidemic was a mild one; the number of inoculations done was 131,220 as against 450,000 in 1928. Inoculation is only accepted in the actual existence of plague.

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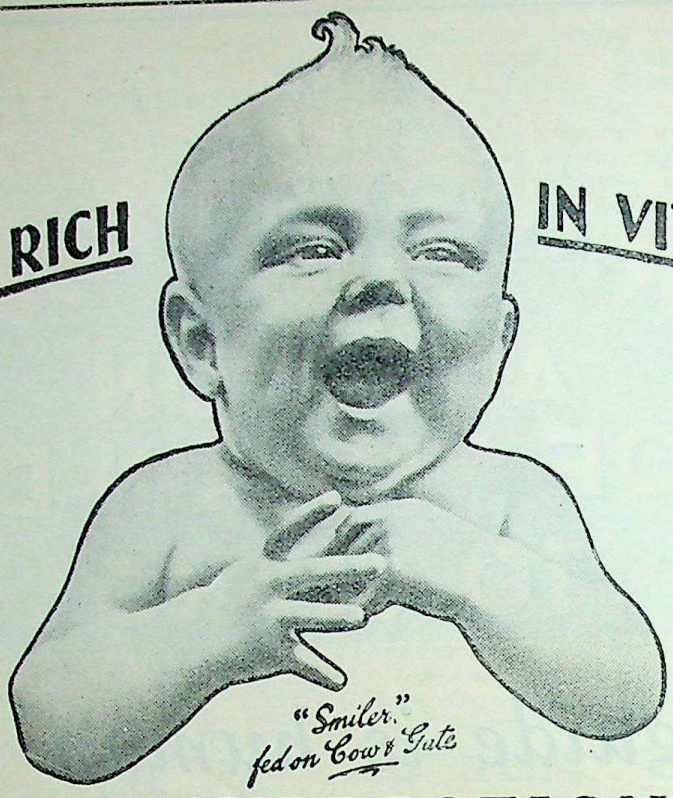

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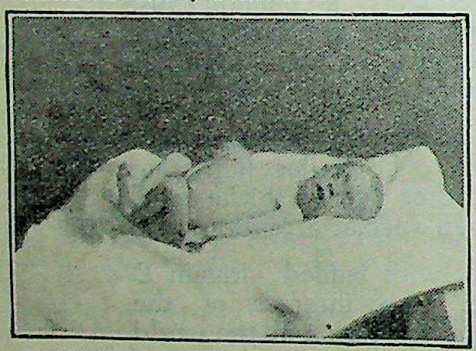
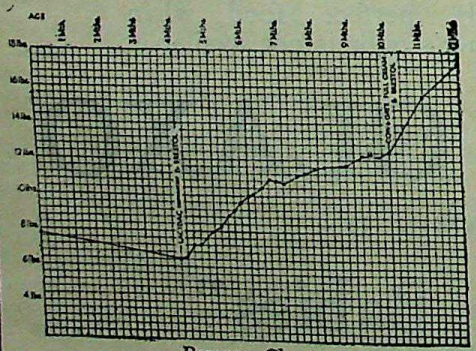
"Baby Hook came under my care shortly after birth suffering with marasmus following whooping cough. Broncho-pneumonia developed and was with great difficulty cleared up, leaving the child in a very low condition. Feeding proved a difficult problem, several things were tried without beneficial results. The results with Cow & Gate were truly wonderful, indeed it is a case of 'a resurrection.'"

Signed.....M.B.Ch.B.



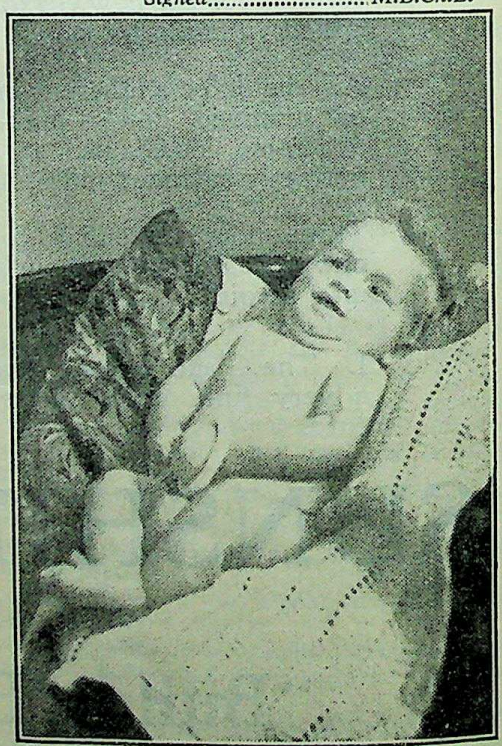
BEFORE—4 months' old, 6 lbs. 9 ozs. in weight

The Foods used primarily were the Cow & Gate Lactic Acid Milk ("Lacidac") and their Humanised Cream ("Brestol"). Subsequently the Baby was put on standard Cow & Gate Milk Food and the Brestol was also continued.



Progress Chart

Baby Hook has now won 2 prizes in Baby Competitions!



AFTER—10 months' old, 12 lbs. 6 ozs. in weight

Please write for literature and Clinical Samples to Agents, or direct to:

Cow & Gate Milk Food

Agents for:
India: Carr & Co., Ltd., Ballard Estate, Bombay
Burma: E. Solomon & Sons, 88, Dalhousie Street, Rangoon
Ceylon: Miller & Co. Ltd., Colombo

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Rat destruction was continued and carried out in many towns. It is done mainly by means of trapping.

The travelling dispensaries are a future of the U. P. Public Health Department. These now number 43; and 14 reserve dispensaries are kept mobilised for emergencies at district headquarters. These dispensaries are now looked on as a most effective agency for dealing with outbreaks of infectious disease. They do a great deal of educational work as well.

Hygiene Publicity Bureau.—This is in the able hands of Dr. A. Sousa who has issued a special report on the year's work which should be read by all those interested.

Police officers are instructed in health matters, supervisors of co-operative societies and schoolmasters get similar instruction. A large number of films have been prepared and exhibited periodically. Posters, pamphlets, and books have also been prepared in various subjects and are widely distributed. Health exhibitions have been arranged and village aid societies started—altogether this seems a very live and energetic branch of the department.

The District Health Service has carried out its duties with energy and optimism: 28 districts have now a qualified health staff, 20 remain yet to be so supplied.

Rural Sanitation has received a great deal of attention. Village uplift committees have been established in many villages and are doing excellent work in trying to improve sanitation in rural areas. Simple anti-malarial work, the construction of wastage pits and manure trenches, the construction of sanitary wells and the provision of village aid dispensaries are all encouraged and a model village was constructed at Nagla Khund in 1929.

Public Analyst's Department.—3,311 samples were examined, a large increase over 1928 due to the extension of the provisions of the Prevention of Adulteration Act. The fines applied in the case of articles of food found adulterated are stated to be quite inadequate to ensure any improvement or prevention.

Maternity and Child Welfare Work.—This is administered by the U. P. branch of the Lady Chelmsford League. Almost all the district headquarters have now maternity and child welfare centres and it is proposed to extend the scope of the work to rural areas. A scheme for this purpose estimated to cost Rs. 2,45,400 has been drawn up. The co-operation of local bodies will be essential.

Fairs.—The Kumbh Mela at Allahabad in January and February 1930 was controlled in its medical and sanitary aspects by the Public Health Department and the activities of the Hygiene Publicity Bureau attracted great attention.

Inspection of schools.—The medical examination of scholars is now carried out by the officers of the Public Health Department. Once a year the scholars are examined in detail for various defects and once a month on parades when the condition of their eyes, teeth, cleanliness, etc., is noted. The usual note is made however that there is a regrettable indifference on the part of parents and guardians to have the defects remedied when they are pointed out. School clinics seem a necessary adjunct.

An interesting note is made as regards Famine Camps. In these a strict sanitary discipline is enforced and the health of the workers was very satisfactory.

The Director of Public Health and his staff are to be congratulated in having a very live and energetic department and the evidence of their work can be fully appreciated in the report under review.

A. D. S.

Correspondence.

THEORY IN MEDICINE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The editor of a medical journal once declined to publish a letter of mine because, he said, it was theoretical rather than practical.

But while it may, or may not, be advisable for an editor to refuse to publish an article that he thinks sets forth a false theory, it is certainly wrong for an editor to refuse to publish it merely because it is theoretical.

What is theory? Theory is the lantern that shows us what path we are going to take. False theories have led the world astray for hundreds of years. True theories have led the world in paths of peace, prosperity, and happiness. No doctor can administer a drug, no surgeon can use a scalpel unless theories have preceded to show them why and how to do these things. "Visionaries," dreamers, idealists, and theorists are higher types of men than practitioners, practical men, and men of action, for the theorist plans what the practitioner merely executes. An architect is a higher type of men than a contractor. Men like Hippocrates, Galen, Paracelsus, are higher types than ordinary medical practitioners, because they founded schools of medicine to which the medical fraternity adhered.

There is no science, art, or profession that should welcome theory more than the medical profession should welcome it, for no science or art has changed more throughout the ages than medicine has changed. It is a far cry from such remedies as powdered bat's wings, the liver of a wolf, and the flesh of a serpent, as recounted in Pliny's *Natural History,* to the theory and practice of modern schools of medicine. And who knows what medical theory and practice will be like five hundred years from now? Whatever they will be like then, they will certainly be different from what they are now.

Theory? We need all the theory we can get, provided there be a modicum of intelligence and genuine thought in it. Theory is the germ of progress.—Yours, etc.,

CHARLES HOOPER,

COEUR D'ALENE,
IDAHO, U. S. A.,
29th September, 1930.

"SHORT TERM FEVERS IN THE PUNJAB."

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I read with considerable interest the article on this subject by Major Jamalludin, I.M.S., in your issue for July, 1930. In the *Antiseptic,* Vol. 27, No. 4, April 1930, I gave an account of the 1928 epidemic of dengue in the Central Jail, Coimbatore. The case sheets and temperature charts were scrutinised by Major-General J. W. D. Megaw, I.M.S., then Surgeon-General with the Government of Madras; who remarked that "it appeared to be a typical outbreak of dengue in a population largely consisting of non-immunized persons. Probably there were also very mild cases among the partially immune."

My cases were extremely similar to Major Jamalludin's. The latter author appears to negative the diagnosis of dengue on account of absence of the rash, but the rash is often very difficult to make out in Indians, and in my experience the rash is not a constant feature in all cases of dengue. One of Major Jamalludin's cases showed leucocytosis in place of leucopænia, but even this does not seem to rule out dengue.—Yours, etc.,

L. A. RAMASWAMY AIYER,
Medical Officer.

LOCAL FUND HOSPITAL,
BADAGARA,
S. INDIA,
4th November, 1930.

[*Note.*—As seen in Calcutta, at least, there is one important finding in thin blood films from early cases of dengue, which appears to be very characteristic, the complete absence of coarsely granular eosinophile leucocytes from the film.—ED., *I. M. G.*]

A CASE OF CHYLURIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Recently I had under treatment a patient suffering from an acute attack of sciatica, for which he

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was taking "Agotan." Suddenly one morning and afternoon the urine became white, rather resembling a solution of phenyl. There was no deposit on standing, and nothing separated out on 24 hours' standing. All the usual tests were applied, both chemical and microscopic, but nothing abnormal could be detected. I subsequently found that in this patient administration of milk or milk preparations gave rise to a milky urine; so also did a rice diet; on a fruit and meat diet the urine was clear, but when the patient went for a long walk it became milky again.

This condition lasted for about three weeks. The liability to a milky appearance after exercise was the last symptom to disappear.

Can any of your readers throw any light on the diagnosis?—Yours, etc.,

M. ASLAM OMAR, L.M.P.

GONDA, U. P.,
17th October, 1930.

A CASE FOR DIAGNOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Possibly one of your readers may be able to help me in the diagnosis of the following case:—

A boy aged about 15, was inoculated in the Government laboratory here with anti-plague vaccine about noon. The same evening he developed fever, but this was regarded by the relatives as a natural reaction, and I was not called in till the third day. I found him with an enlarged spleen, conjunctivitis of both eyes, and a bleb resembling a second degree burn at the site of inoculation; there were also signs of bronchitis. I gave him an injection of quinine on account of the enlarged spleen, and put him on a simple diaphoretic and expectorant mixture; the bleb was opened and dressed.

The next day a measles-like rash appeared on his face, chest and abdomen. (I should mention that measles is rampant here at present.) That evening blebs developed on the soles of the feet and ears, also on the abdomen. Fever has since continued, and further crops of blebs appear.

My first diagnosis was either influenza or measles. Neither, however, is tenable. Yet the fever would seem to be an eruptive one, rather than the result of the inoculation.

Further points in connection with case are:—

(*i*) The patient's brother and others were inoculated at the same time and showed no ill effects.

(*ii*) The patient has received quinine injections in the past at my hands without showing ill effects.

(*iii*) The dose of vaccine recommended is 2 c.c.; or 1 c.c., followed by 2 c.c. seven or ten days later.

(*iv*) The syringe and needle were boiled before use.

(*v*) No organisms could be cultivated from the serum from the blebs.

(*vi*) The laboratory here follows the method of preparation of anti-plague vaccine in use at the Haffkine Institute, Bombay.—Yours, etc.,

K. V. ADALJA, M.B., B.S.

Box 774,
NAIROBI, KENYA COLONY,
17th September, 1930.

INTRAVENOUS IODINE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I was called in to see a patient, Mrs. N. M., aged about 20, who had been suffering from a hectic fever with temperatures ranging to 103°F., for about a month. She had had the usual treatment for malaria. There was no other symptom except a horizontal hard mass of enlarged glands in the left groin; these had been there for about three years, and were painless.

Enquiry into the previous history led me to suspect a chronic infection with abdominal tuberculosis. The von Pirquet test gave a strongly positive reaction. Intravenous iodine was then commenced; the first few doses being given once a week, and the last two or three at intervals of a fortnight. Each time there was high reaction, but subsequent improvement. The fever rapidly abated, and the patient has now been in a good state of health for the past ten months. The painless mass of enlarged glands still remains, however.—Yours, etc.,

M. ASLAM OMAR, L.M.P.

GONDA, U. P.,
21st October, 1930.

THERAPY IN MALARIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the treatment of malaria, and especially of benign tertian infections, it would appear to be rational to utilise the other alkaloids of cinchona bark, as well as quinine, and to include iron and arsenic. In this connection a pill which is both cheap and efficacious is sold on the market under the trade name of "Azarin," and is stated to have the following compositions:—

℞ Quininæ sulphatis	.. ..	gr. ii.
Cinchona febrifuge	.. ..	„ 3/4
Quinoidine sulphatis	.. ..	„ 3/4
Ferri arsenias ..	.. ..	„ 3/30
Extr. nucis vomica	.. ..	„ 1/4
Pulv. ipecac. ..	.. ..	„ 3/20
Extr. belladonnæ	.. ..	„ 1/5
Extr. gemmæ	.. ..	„ 1/5

The last item is obtained from an indigenous plant, and is said to have an antiperiodic action and to stimulate the liver.

In R. Ghosh's *Materia Medica* he gives a prescription which I have found useful in cases of chronic malaria with enlargement of the spleen. The formula is as follows:—

Quininæ sulphatis	.. ..	gr. ii.
Ferri sulphatis ..	.. ..	„ 1/2
Pulv. rhei ..	.. ..	„ 5
Pulv. ipecac.	.. ..	„ 1/8
Pulv. zingib. ..	.. ..	„ 2½
Sodi bicarbonatis	.. ..	„ 2½

The stimulant action of the pulv. rhei and the pulv. ipecac. on the liver appears to be of value here.

The treatment of an acute case of malaria may consist in the administration of quinine alone, but in chronic and relapsing cases quinine therapy requires to be supplemented by hæmatinic drugs and by those having a stimulant action on the liver.—Yours, etc.,

S. L. SARKAR.

NOAKHALI,
12th November, 1930.

FOOD-POISONING VERSUS CHOLERA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In connection with Dr. Tomb's article on this subject on p. 494 of your issue for September, 1930, when I was in Calcutta in 1922-23 for the D. T. M. (Bengal) course, there was an instance when several nurses of the Medical College group of hospitals were suddenly taken ill with food-poisoning; the infection subsequently being traced to an infected milk pudding. I do not remember now the exact variety of the organism isolated, but it belonged to the Salmonella group of bacteria. I may add that no death occurred in this outbreak of food-poisoning.—Yours, etc.,

A. F. WINNINGTON DA COSTA,
F.R.C.S., ED., D.T.M. (Ben.), L.M.S.,
Civil Surgeon.

HOSHANGABAD, C. P.,
23rd September, 1930.

Service Notes.

APPOINTMENTS AND TRANSFERS.

THE services of Lieutenant-Colonel R. N. Chopra, M.A., M.D. (Cantab.), I.M.S., Professor of Pharmacology,

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Aspirin

Bayer's 'ASPIRIN'

Its world-wide reputation depends on the quality of the

ORIGINAL PRODUCT.

Pyramidon

'PYRAMIDON'

the antipyretic and analgesic which has likewise proved very successful in millions of cases.

Literature and full particulars on application:

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Trading Co., Ltd.,
Calcutta
Pharmaceutical Dept.
"Bayer-Meister-Lucius"
P. O. Box No. 2122,
15, Clive Street,
Calcutta

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MAGNESIUM-PERHYDROL

E. MERCK
DARMSTADT

Neutralises Acid

in gastric hyperacidity, heartburn, diabetic acidosis and acetonuria, and may be given in place of sodium bicarbonate.

Checks Fermentation

in fermentation dyspepsia, flatulence, and other putrefactive conditions. Together with Medicinal Charcoal 'Merck' it is of great value in meteorism.

Gentle Laxative

for the sluggish bowel, or in chronic constipation with its attendant symptoms of auto-intoxication.

TRADE **'MAGNESIUM-PERHYDROL'** MARK

Powder 15% and 25%
Bottles of 25, 50 and 100 gm.

Tablets 25%
Tubes of 20 and bottles of 50 and 100 tablets

Further literature and information may be obtained from the

Agents in India:—

MESSRS. MARTIN & HARRIS, LTD.,

Rowlette Building,
17, Prinsep Street,
CALCUTTA

119, Parsi Bazar Street,
Fort,
BOMBAY

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School of Tropical Medicine and Hygiene, Calcutta, and Lecturer of Materia Medica, Medical College, Calcutta, are placed temporarily at the disposal of the Government of India, with effect from the 1st October, 1930.

Lieutenant-Colonel E. W. O'G. Kirwan, I.M.S., is confirmed in his appointment as Professor of Ophthalmic Surgery, Medical College, Calcutta, and Ophthalmic Surgeon to the College Hospitals.

On return from leave Lieutenant-Colonel C. R. O'Brien, I.M.S., is appointed as Civil Surgeon, Dacca, *vice* Major B. H. Singh, I.M.S., transferred.

Lieutenant-Colonel L. Cook, C.I.E., M.B., F.R.C.S., Civil Surgeon, Bhagalpur, has been appointed, until further orders, to officiate as Inspector-General of Civil Hospitals, Bihar and Orissa, with effect from the 9th December, 1930.

The services of Lieutenant-Colonel H. S. Cormack, M.C., M.B., F.R.C.S., have been placed permanently at the disposal of the Government of Burma, with effect from the 7th November, 1922.

The services of Major S. D. Sondhi, M.C., M.B., have been placed permanently at the disposal of the Government of the Punjab, with effect from the 28th January, 1929, for employment in the Jails Department.

Major B. H. Singh, I.M.S., officiating Civil Surgeon, Dacca, is appointed as Civil Surgeon, Burdwan, *vice* Dr. P. C. Mukherjee, transferred.

On return from leave Major N. C. Kapur, I.M.S., is appointed as Civil Surgeon, Murshidabad.

Subject to His Majesty's approval the undermentioned officers, whose appointments on probation were notified in the London Gazettes, dated 27th September, 1929, and 9th May, 1930, have been confirmed in the following order on passing the necessary course of instruction:—

Captains.

J. M. Wilder.
E. G. Hurd-Wood, M.B.
R. L. Frost.
K. S. Fitch.
W. T. Taylor, M.B.

Lieutenants.

E. P. N. M. Early, M.B.
W. McAdam, M.B.
J. H. Gorman, M.B.
S. M. Kharegat, M.B.
D. H. Waldron, M.B.
E. B. Eedle, M.B.
A. B. Guild, M.B.

The undermentioned officer has been appointed to the Indian Medical Service:—

Lieutenant (on probation) Jeremiah O'Neill. Dated 23rd October, 1930.

LEAVE.

Colonel R. McCarrison, C.I.E., K.H.P., an officer of the Medical Research Department on foreign service under the Indian Research Fund Association, has been granted leave on average pay for 4 months, with effect from the 10th March, 1931, or subsequent date on which he avails himself of it. His services have been placed at the disposal of the Director-General, Indian Medical Service, from the date on which he proceeds on leave.

Colonel W. M. Houston, M.B., V.H.S., Inspector-General of Civil Hospitals, Bihar and Orissa, has been granted, preparatory to retirement, leave on average pay for 1 month and 14 days, combined with leave on half average pay for 6 months and 17th days, with effect from the 9th December, 1930.

Lieutenant-Colonel E. H. V. Hodge, M.D., M.R.C.P., I.M.S., officiating Civil Surgeon, Darjeeling, is granted leave for 4 months, from the 4th November, 1930, or date of availing.

Major H. K. Rowntree, M.C., M.B., Civil Surgeon, Simla East, has been granted leave on average pay for 2 months and 18 days, with effect from the 14th November, 1930, during which period his duties will be carried on by Lieutenant-Colonel V. N. Whitamore, O.B.E., F.R.C.S.E., Civil Surgeon, Simla East, in addition to his own.

PROMOTIONS.

The promotion of Lieutenant-Colonel A. J. Symes to the rank of Major and Lieutenant-Colonel has been ante-dated to the 1st February, 1920, and 1st February, 1928, respectively.

The promotion of Major A. Ba Thaw, M.B., I.M.S., to his present rank is ante-dated to the 15th July, 1929.

The promotion of Major H. E. Murray, M.B., to his present rank is ante-dated to 20th April, 1926.

Captain J. Carrey, M.B., has been promoted to the rank of Major, with effect from the 24th October, 1930.

The undermentioned Lieutenants of the Indian Medical Service have been promoted to the rank of Captain (Provisional)—

B. D. Khurana. Dated 28th October, 1930.

J. Singh. Dated 19th November, 1930.

Lieutenant Rewati Raman Bakhshi, M.B., I.M.S. (T.C.), has been appointed as a Lieutenant (on probation) from 6th November, 1929, with seniority 19th August, 1927.

Lieutenant (on probation) Rewati Raman Bakhshi, M.B., has been promoted as Captain (provisional) on probation. Dated 19th August, 1930.

Lieutenant L. G. Backhurst has been promoted to the rank of Captain (provisional), with effect from the 10th November, 1930.

RETIREMENTS.

The date of retirement of Major-General Sir T. H. Symons, K.B.E., C.S.I., K.H.S., is the 25th September, 1930, and not 15th September, 1930.

Major-General G. Tate, C.I.E., M.B., K.H.S., I.M.S. Dated the 16th September, 1930.

Lieutenant-Colonel S. M. Hepworth, I.M.S. Dated 7th September, 1930.

Lieutenant-Colonel (Brevet-Colonel) R. A. Needham, C.I.E., D.S.O., M.D., F.R.C.P. Dated the 24th October, 1930.

Lieutenant-Colonel H. G. S. Webb. 13th October, 1930.

Lieutenant-Colonel J. G. G. Swan, C.I.E., M.B. 20th October, 1930.

Notes.

"S. U. P. 36," BRITISH DRUG HOUSES.

THE search for an effective remedy against the common cold and against influenzal and catarrhal conditions in general still goes on. In general it may be said that Ehrlich's views as to the possibility of a *therapia magna sterilisans* are losing ground, and it is being realised that the action of most of the drugs and agents effective in acute infections is an indirect one, *via* a combination with substances produced by the tissues of the body.

"S. U. P. 36" is stated to belong to the group of substances known as the "symmetrical ureas"; and to be the symmetrical urea of para-benzoyl-para-amino-benzoyl-amino-naphthol 3 : 6 sodium sulphonate, and is a dye derivative, which it has been arranged shall

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be manufactured by the British Dyestuffs Corporation, and for it to be put up in a convenient form for the medical profession by the British Drug Houses, Ltd.

Collected reports speak of the value of this preparation in inflammatory and septic conditions in general—dose 0.01 grm., injected intramuscularly on two successive days; in coryza and influenza—dose 0.005 to 0.01 grm. injected as soon as possible; in boils and acute staphylococcic infections, hay fever, acute pleurisy, broncho-pneumonia and pneumococcal pneumonia; in the toxæmias of pregnancy; and in gonorrhœal complications, such as peri-urethral abscess. The dose in general use is 0.01 gram repeated at two or three days intervals. Abstracts from standard and very well known journals speak of its value. It is put up in ampoules and in rubber-capped vaccine bottles.

Information with regard to this preparation is available from the British Drug Houses, Ltd., Graham Street, City Road, London, N.1.

THE "HOLWAY" DIATHERMY APPARATUS.

A BROCHURE recently received from Messrs. Newton and Wright, 471-3, Hornsey Road, London, N.19, deals with this newly introduced apparatus. It is stated that it has been developed to meet the demand for a diathermy machine manufactured to the highest standard of modern engineering practice. The apparatus is designed both for medical and surgical diathermy; is of ample power for the large output often required in hospital practice, but at the same time equally suitable for delicate surgical work where the energy required is extremely small. Terminals are provided whereby a relatively high voltage and low frequency current can be obtained for medical treatment, and alternatively, by using other terminals, a relatively lower voltage at a higher frequency is provided for surgical purposes. The spark gap is of the air cooled variety with large tungsten electrodes, and the design permits of extremely accurate adjustment by merely turning a knob fitted with an index dial. The main transformer is of the closed core type, and the condensers are oil insulated, a wide factor of safety being afforded in both these parts. The oscillatory circuit includes a "loose coupled" transformer, by means of which the intensity of the current is controlled, and which also serves to insulate the patient entirely from the main high tension circuit. The apparatus is assembled on a trolley table, and a socket is fitted for the connection of a foot switch, often essential in surgical work where both hands may be required for manipulation. The complete apparatus for A.C. current is listed at £52; a rotary convertor for D.C. at £32; and the foot switch at £4-18. The brochure also includes prices of electrodes for diathermy, and electrodes for special purposes.

"DISULPHAMIN."

"DISULPHAMIN" is stated to be a benzoyl-sulphon-formol-antipyrin-camphor product which is put up in gelatine capsules of 7½ grains, to be dissolved in half a glass of cold water, and taken orally at a dosage of 8 capsules a day. It is manufactured by the Bio-Chemical Laboratories, Ltd., Locarno, Switzerland, and the British agents are, Messrs. Coates and Cooper, 41, Great Tower Street, London, E.C.3. It is claimed that this formula is efficacious in cases of influenza, coryza, pneumonia, pyelitis, puerperal sepsis, and surgical sepsis.

It is claimed for this preparation that the ortho-oxybenzoyl group in it acts as an antiseptic and anti-pyretic; that the formol group has a diuretic and anti-septic action; that the nuclein group included produces hyper-leucocytosis; and that the camphor group has an antiseptic action. Also that laboratory tests have proved that at a dilution of 1 : 10,000, it is lethal to freshly isolated strains of *Staphylococcus aureus, Streptococcus erysipelatus, Diplococcus pneumoniæ,* at 1 : 50,000 the gonococcus; and *B. coli,* and *B. typhosus* at 1 : 5,000; also that it is non-toxic to tissues. Good results are claimed in a paper by Leandro Tomarkin in the *International Journal of Medicine and Surgery,* 1929, in cases of both broncho- and lobar pneumonia, puerperal sepsis, pyelitis, and influenza.

The claims made for the preparation are very considerable; but if any agent, to be administered orally, is going to prove of real value in general septic and catarrhal conditions in the tropics, it should be of considerable interest. Messrs. Coates & Cooper will be glad to furnish further information to members of the medical profession on application.

"BEMAX."

WE have recently received a set of reprints of publications from the "Bemax" laboratories, 38, Danemere Street, Putney, London, S.W. 15, dealing with this preparation. Essentially, "Bemax" is intended as a tonic food full of vitamines prepared from the embryo or germ of cereals selected for their vitamine content—such as wheat, rye, or barley. It has been successfully administered to infants of only 3 months of age, also to diabetics without causing any increased glycosuria. Clinical reports quoted mention its value as a tonic building food for growing and rickety children, its value in *B. coli* and other urinary infections, its value in its addition of vitamines A and B to the dietary, in conditions of intestinal stasis and in improving general nutrition in the asthenic subject—in which connection some striking graphs are given for the increase in weight of rats fed on a normal diet and on a diet supplemented by "Bemax." Other conditions in which the preparation is said to be of value are gastric atony, as a preventive in rickets, in beriberi, and in all conditions of A and B vitamine deficiencies. Those interested in dietary problems in India would do well to write for the set of reprints.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis,* if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette,* c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

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Original Articles.

EPIDEMIC DROPSY IN A FAMILY AT SANDWIP ISLAND.

By SARASI LAL SARKAR, L.M.S.,
Civil Surgeon, Noakhali.

THERE is some advantage in the study of attacks of epidemic dropsy in *mofussil* towns and villages, specially where the attacks are localized. In a career of Government service of the writer extending over 30 years, he has reported several localized attacks in the *Indian Medical Gazette* and other medical papers. There has also been a large amount of general observation regarding the disease which has thoroughly impressed the writer greatly with regard to the toxic origin of the disease, yet has also shown that the vitamine deficiency has also very probably something to do with the disease.

My last article on the subject of epidemic dropsy was published in the May number of the *Indian Medical Gazette*, 1927, written jointly with Dr. B. M. Gupta, District Health Officer, Noakhali. In this paper, I showed that there were 30 inches of rainfall from the middle of August up to the end of the first week of September. The heaviest rainfall was from 30th August to 5th September, during which period the total amount of rainfall was 17½ inches. There were several cases of epidemic dropsy during the first two weeks of September. On examination of rice supplies in the houses affected, they presented the appearance of being infected, as there were white spots in many of the grains, the aleurone layer of the rice being found to be damaged. The rice was found to be liable to get soaked and damp in several cases. It was thought that this damp and damaged condition of the rice produced a toxin in them which gave rise to the disease.

Lieut.-Col. G. G. Jolly in the *Indian Medical Gazette*, July 1930, has reported on beriberi in Cheduba Island, Arakan, Burma. As I intend to deal presently with some cases of epidemic dropsy which appeared during the present year in the island of Sandwip, showing the peculiarity that all the cases occurred in a single family, I shall note here for comparison some points from the paper of Lieut.-Col. Jolly on beriberi in Cheduba Island. These are as follows:—

During the rainy season of 1929 approximately 1,650 cases with 188 deaths occurred among a population of 32,500. The coastal villages suffered most, those in the interior being comparatively free.

The disease is definitely seasonal, its incidence being during the rains, July and August being the months in which most cases develop.

While the occurrence of mouldy rice cannot be entirely excluded, there is very definite evidence of diet deficiency, particularly marked in the months of June, July and August. At this season white rice with a meagre and insufficient quantity of salted fish, a few green leaves and bamboo shoots, form the essential diet in villages.

The villagers make no use of the rice-cleanings except to feed cattle and chickens. They further discard the water in which their rice is boiled.

Now regarding the etiology of the disease there was some difference of opinion between the opinion of the Sub-Assistant Surgeon who visited the island at a time when the epidemic was still prevailing, and the opinion of Lieut.-Colonel Jolly about eight months later.

The Sub-Assistant Surgeon's conclusions were that the mouldy rice was the cause of the outbreak. He formed this opinion because he considered that, if diet deficiency were the cause, the disease should not be so definitely associated with the rains. He noted that the rains had been unusually severe that season. He concluded that the people ate this mouldy rice to excess and that the disease was due to a toxin present in the rice. He believed that towards the end of August or September, with an improvement in the weather, the rice also improved in condition; and also the hard labour in the rice fields being over by then, the people did not eat so much of the rice, thereby reducing the amount of the toxin consumed. He formed the opinion that the hand pounded rice, as used by the villagers, was not totally devoid of vitamine B.

Now these conclusions of the Sub-Assistant Surgeon practically agree with those of ours in our 1927 paper in which we stated—"We may suppose that epidemic dropsy is caused by some micro-organisms such as pathogenic fungi infecting rice. These micro-organisms develop in a moist condition of the rice when the temperature is comparatively high. When the rice is stored under such conditions as to exclude sunlight and air it favours the growth of such organisms. Moreover the organisms adhering to the gunny-bags and infecting the rice stored in them may give rise to the disease as noted above."

It is possible that there may be some variation in these micro-organisms, causing a certain amount of variation in the clinical symptoms of the disease.

For example in the epidemic at Comilla Jail reported in the *Indian Medical Gazette*, March 1903, by Col. Anderson, the skin was harsh and dry, while in the epidemic in Calcutta General Hospital reported in the *Indian Medical Gazette*, April 1910, by General Megaw, more than half the cases had diffuse erythema. While in these last series of cases there were marked cardiovascular symptoms, in most of the cases observed in the Basti Jail outbreak, described by Colonel Greig, there was a normal pulse. In the cases

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occurring in Barisal Jail reported in the *Indian Medical Gazette*, 1903, by Colonel Cobb, the sensory symptoms were as a rule normal, while the cases in Sylhet Jail reported in the *Indian Medical Gazette*, May 1903, nervous symptoms such as hyperæsthesia, anæsthesia, and residual paralysis were markedly present. In the cases in the Allahabad private family reported in the *Indian Medical Gazette*, February 1923, by General Megaw and R. N. Banerjee, hæmorrhagic scurvy-like symptoms were markedly present.

Regarding the epidemic in Cheduba Island, Colonel Jolly states: "A consideration of all the circumstances leads me to the opinion that while mouldy rice as a possible factor cannot be entirely excluded, all the evidence points in the direction of the disease being a true beriberi due to diet deficiency." My view of the matter is that though diet deficiency very probably has much to do with the appearance, as well as the progress of the disease, it is not the real cause of the disease. The real cause of the disease is some micro-organism, and certain climatic and environmental conditions help the culture of these micro-organisms in the infected rice.

In support of my view, I give below a brief report of the outbreak of epidemic dropsy which I have observed in the island of Sandwip during the year 1930.

In the first week of January 1930, Mr. P. Ahmed came to Sandwip with his family, being posted as a *munsiff* in the place. His immediate predecessor Babu Manindra Prasad Singh, who lived in the house of the *munsiff* with his family consisting of young children, did not suffer from the disease. But the previous *munsiff*, i.e., the predecessor of Babu Manindra Prasad Singh, named Babu Manmatha Nath Chaudhuri, suffered along with his children and members of family from epidemic dropsy. He lived here in 1926 and 1927. This house has got a "tarja" wall, i.e., walls made of split bamboo and therefore no whitewashing is possible. However when Mr. P. Ahmed, *munsiff*, came he got the walls, doors and floor thoroughly scrubbed and washed. He got the courtyard and the other space within the compound raised with earth taken from a tank which was then being re-excavated. Consequently the house remained damp for some time and it was during this damp period that Mr. P. Ahmed with his family suffered from the disease.

Mr. P. Ahmed, who is of 57 years of age, gives the history of suffering from an attack of epidemic dropsy during October 1907.

The members of the family are accustomed to take fine polished rice. After coming to Sandwip, they took country fine rice for about a month. Then they received a supply of *balam* rice from Barisal on 16th January, 1930, and this rice was served for a week only. Mr. P. Ahmed has informed me that he along with his family members gave up taking that rice, not because it interfered with digestion, but because it was not up to their taste.

Either on 28th February, 1930, or 1st March, 1930, Mr. P. Ahmed first noticed the signs of œdema in the legs of his third son, aged 13 years. This child recovered from an attack of typhoid fever at Chinsura before the family members came to Sandwip. He was all along eating old fine rice and not the rice which was being used by other members of the family. The curious fact should be noted that he did not use the *balam* rice which came from Barisal. Now if we believe that this Barisal rice contained some micro-organisms which gave rise to epidemic dropsy in the family, we have to suppose that this micro-organism somehow or other infected the rice which was being used by him and developed and caused the formation of a toxin in the rice, which was helped by the dampness of the house owing to its recent repair from the damp earth excavated from the tank. He was probably the earliest victim of the disease, because probably he had not only the weakest health, but he was deficient in vitamine B, because he had been taking fine old rice, whilst the other members of the family were taking country rice.

Mr. P. Ahmed himself and his second son, aged 17 years, got swelling of the legs on 5th or 6th March, 1930. His fourth and fifth sons, aged 8 and 7 years respectively, and his first and second daughters, aged 12 and 5 years respectively, showed signs of swelling of their legs towards the middle of March 1930. His fourth and fifth sons and second daughter got rid of the swelling in two or three days without any treatment whatever. His first daughter got rid of it in a week or ten days and she did not take any medicine. Of his two servants who got the disease, the older one did not take any medicine and was cured of the disease in about a month. Of the remaining patients Mr. P. Ahmed recovered by the middle of April 1930. His second and third sons and the younger servant suffered from it till the beginning of June 1930. During the period of illness the family members took a large quantity of raw tomato and boiled vegetables and a very small quantity of very coarse rice (*majasail*) with the gruel.

Regarding the clinical symptoms it may be said that none of the patients was seriously ill during any time of the disease. The most prominent symptom was the œdema of the legs, regarding which the *munsiff* has stated,—"A curious feature in our case was that a round of brisk walking or a game of tennis had the effect of reducing the swelling of the limbs. The swelling appears to be reduced by pressure and re-appears when pressure is removed. As usual the swelling was greater in the evening than in the morning." Nothing can be found on examination of urine. There was looseness of the bowels in some cases. His boy aged 17 years and his girl aged 5 years got

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slight fever in the beginning of the disease for a day or two. There was a feeling of weakness in most of the cases but no cardiovascular symptoms could be noticed. Nothing could be found on examination of the urine. It should be noted that the wife of Mr. Ahmed, his youngest servant, as well as his boy aged 3 years, escaped from the attack of the disease.

In this connection I state below the opinion of Mr. Ahmed expressed in a letter to me, though I differ from him:—"I am chary to lay the blame at the door of the maund of *balam* rice received from Barisal on 16th January, 1930, and consumed for a week by twelve persons, when three out of those twelve were not afflicted with œdema of legs, and then again the nine who suffered from it first showed signs of development of this disease more than a month after its use. We gave up taking that rice, not because it interfered with digestion, but because it was not up to our taste. Of course, my youngest son did not take the rice, but my wife and third servant took just the quantity they take of any other variety of rice. They did not take any other food rich in vitamine B than that which the other members of the family took. I may explain the fact of my wife, youngest son and third servant having escaped the disease by saying that they had enough of vitamine B to resist the attack, in which the other members were deficient. My third son who first showed signs of development of œdema did not at all take the *balam* rice."

To express my opinion regarding the vitamine B deficiency view of the disease I may quote the following verbatim from an excellent article published by General J. W. D. Megaw in the *Indian Medical Gazette*, May 1923.

"It must be clearly understood that while the rice intoxication view appears to me to explain the facts which are known in connection with the beriberi disease group, there is no desire to ignore the anti-neuritic accessory food factor. The importance of this as well as of the other accessory food factors is well established, and it is quite possible that deficiency in vitamine B may play a part in the causation of beriberi similar to that played by malnutrition in dysentery. It is only with those who insist on vitamine B is the only factor of importance, that my quarrel lies; I hold that to insist on vitamine B as the one essential factor in causing beriberi is a dangerous attitude. I think that further research into the cause of beriberi is still essential, and that rice intoxication must still be seriously considered as a possible, and even as a highly probable factor."

However, from the point of the rice intoxication view, the point raised by Mr. Ahmed, viz., that his third son who was the earliest victim of the disease, did not take any quantity of Barisal rice requires an answer. I have already given my answer. I may state here briefly again that probably some micro-organism which was present in the stock of Barisal rice infected the fine old rice which was used by the boy, which was devoid of its aleurone layer, which is protective against such an infection. The house was markedly damp, owing to the repair of it by the moist earth obtained from the digging up of a tank in the neighbourhood. Moreover the boy was weak in health, and so was very probably deficient in vitamine B, which is a predisposing cause of the infection, if not the direct cause.

In the article of General Megaw which has been referred to above, he states:—

"An objection to the rice intoxication view is that beriberi, including epidemic dropsy, has occurred among persons who do not appear to have included rice in their diet. These cases are so exceptional that it is necessary to examine them carefully. One possible explanation is that rice may have been used as an adulterant of wheat flour or other articles of diet. This is known to take place when unscrupulous dealers see their way to making an extra profit owing to the relative cheapness of rice. Another possible explanation is that under exceptional circumstances the poison may be formed in other grains besides the rice."

This last explanation of General Megaw becomes easily understandable if we assume the micro-organic origin of the disease.

This micro-organic origin of the disease will also explain the fact pointed out by Mr. Ahmed that nine of the persons concerned in the above epidemic showed signs of development of this disease more than a month after the use of the incriminated stock of rice. We may suppose that the micro-organism in these cases dwelt somewhere in the body and gradually produced its toxin and caused the symptoms.

In this connection, I may mention below an interesting phenomenon connected with the disease which I noticed in the case of a pleader coming from Kalimpong in the Darjeeling district. This gentleman with his family settled at Kalimpong, where he bought a house and an orange garden and was living healthily with his family members. Suddenly last year epidemic dropsy appeared there and infected several persons, all of whom obtained the supply of their rice from a particular shop. The medical officer of the place, who had not seen any case of the disease previously, did not understand the nature of it. The patient lost two of his children from sudden heart failure, one of whom died the very day he was leaving Kalimpong as the effect of over-exertion in helping the parents to pack up his things. There was no question of vitamine B deficiency in the family. When the gentleman came to Calcutta, his case was diagnosed to be one of epidemic dropsy and his heart was found to be weak and his pulse beat was about 90 to 100. In this

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state of affairs he got an attack of pneumonia and recovered from the same after a long struggle. After his recovery from pneumonia, it was found that all the symptoms of epidemic dropsy, such as the weakness of heart, the increase of pulse beat, had disappeared.

Now if we assume the micro-organic theory of the disease, we may explain the phenomena in this case by the fact that the micro-organism of the disease had been killed off by the high leucocytosis produced by the pneumonia, or by the effect of the toxins produced by the micro-organisms specific to pneumonia. I would draw the attention of medical men to this peculiar case with a view to finding out whether any similar case has come under their observation and whether they have found that the production of leucocytosis in any way exerts a curative effect on this disease.

In this paper I have referred to the recent paper of Lieut.-Colonel G. G. Jolly on the epidemic of this disease in Cheduba Island. The Public Health Department of Burma, in my humble opinion, can throw a good deal of light on the etiology of this disease, if this department continues its observation on this disease in this particular island for a few more years. If the origin of the disease is caused by a micro-organism the virulence of the epidemic will show marked variation from year to year, as I have found from my own observations in the islands near Noakhali. It is possible that they will find the occurrence of the disease in isolated families which cannot be explained by the vitamine B deficiency theory alone. It is also a significant fact that in Cheduba Island the ravages of the disease are confined to the neighbourhood of the steamer station and that it does not occur in other parts of the island. This is also the case in the islands of this district. It will also be of interest to get the observations of other authorities about epidemic outbreaks of the disease in out of the way places like Sandwip Island or Cheduba Island.

Summary.

In the island of Sandwip, situated about 25 miles from the sea-coast in the Bay of Bengal, there was epidemic dropsy in 1930 amongst the members of the family of a *munsiff* there, while there was no other case in the neighbourhood or in the whole island. The *munsiff* brought a quantity of polished rice from Barisal, which was very probably the source of infection. The first victim of epidemic dropsy was a sick boy who was taking fine rice and did not take any quantity of Barisal rice. But still it is very likely this rice was infected by some micro-organism from the Barisal rice owing to the fact that the house had recently been repaired by mud dug up from a tank which was being excavated and thus was exceedingly damp. In the year 1927 there was an outbreak of epidemic dropsy in the island and some of the families affected, though they took local rice, stored the rice in gunny bags in which Barisal rice had been brought, and epidemic dropsy was then raging in Barisal. The author compares this epidemic with that described recently in the island of Cheduba in Burma and mentions some facts which support the theory that the disease is caused by some micro-organism.

HEART AFFECTIONS IN BENGALI BABIES.

CASE RECORDS.

By J. DAS GUPTA, M.B., D.P.H.,

Demonstrator of Pathology, Carmichael Medical College, Physician in Charge, Babies Home, Calcutta.

MY observations have been made on babies of an average age between one and three months, excepting one aged one and half years, who were admitted to the Babies Home, Calcutta, during the course of three months. The main cardinal points that were noted were extreme emaciation and anæmia, fever, affection of the valves of the heart, bruit, and defective rate and conductivity of the heart-beat.

Anæmia and rapid emaciation were present in all cases of my series, the hæmoglobin varying from 55 to 70 per cent. Valve affections were the most common form, particularly of the mitral valve, and murmurs were persistent in different postures and different times. I have found that all cases of marasmic babies with a bruit over the heart, whether due to malformation or some disease inherited antenatally, always end fatally within a very short space of time from cardiac failure.

Regarding the causes of the affection, double mitral regurgitation and incompetence, congenital syphilis, endocarditis, and malformation of the heart usually predominated, but the differential diagnosis in my cases has been rather difficult since these symptoms have not always been characteristic and further it is very difficult to handle such tiny babies and do all the systematic examination necessary in heart cases. My difficulty is whether the affections are due to congenital malformation or some disease (organic or functional) inherited antenatally, but on account of numerous difficulties and for the want of post-mortem facilities, I could not clear up these points except to give a provisional clinical diagnosis. The total blood count for polycythæmia was not done, except in the last case, an important step which was omitted for want of time. No tracings of the pulse or blood pressure have been taken.

Lividity of the lips, cyanosis and other symptoms of pulmonary obstruction, which are so common in malformations of the heart, have seldom been observed in the small number of cases (7 only) that have come under me during

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the three months, except in two cases, one of which had two attacks of bronchitis during the course of the illness, and another with cyanosis but no apparent affection of heart or lung (Case 4).

Fever.—Daily intermittent, with a rise to 100 or 101°F. was present in most cases. Males are more affected than females.

Simple dilatation of the heart was observed in one case, the apex beat being in the fourth space, anterior axillary line, and forcible in character. There was *no* bruit over any region of the heart or any sign of cardiac embarrassment. This baby was carried away by dysentery very soon. Probably this dilatation was of functional origin.

Partial heart block was observed in one case only. The pulse rate varied from 60 to 64 per minute, occasionally irregular (3 to 4 beats and one stop). Excepting this low rate there was no other characteristic affection of the heart or any part of the circulatory system.

Sudden failure of the heart in apparently healthy babies has been noted to be rather common, particularly in Bengali babies, and more so when it supervenes on ordinary ailments, e.g., dysentery or fever.

Regarding the treatment of heart affections in such tiny babies, since the source of infection is extremely difficult to trace (in the absence of characteristic signs), the treatment has been mainly symptomatic. Ung. hydragyri has been used in all cases. Digitalis and sulphates have been found to be useful in cases where there is œdema of the legs and face, but the effects seem to be temporary.

Anæmia.—Here the difficulty is that the cause is unknown. However, the use of ung. hydragyri, syrup of hæmoglobin and breast feeding by wet nurses (since all the babies are motherless and picked up from the streets) were used as a routine. It seemed rather hazardous to me to use iron arsenite for such tiny babies and to push it regularly. Whole blood injection was tried in one case but the result was disappointing. The result of the treatment of anæmia has been unsatisfactory with me.

I give below only the cases of which the records have been kept.

Case 1.—Santi, female child, aged 2 months 10 days, left by the mother and admitted to the "Babies Home" on 22nd March, 1929; died on 30th April, 1929.

General examination.—Baby highly marasmic and anæmic, weight on admission 4 lbs. 8 ozs., daily intermittent fever rising to 100.6 to 101°F. maximum, œdema of face and legs, no evidence of congenital syphilis excepting the marasmus. Liver slightly enlarged, hæmoglobin 60 per cent. No malaria parasite seen in blood films, urine culture sterile.

Circulatory system.—Pulse 160 per minute; during the course of treatment it came down to 120 per minute.

Mitral area.—To and fro murmur, the systolic murmur being more sharp and conducted towards the axilla and the back, and the diastolic murmur being soft and continuous with the systolic bruit.

Pulmonary area.—Both the sounds replaced by a murmur just like the mitral one but the systolic bruit was not so sharp, as in the mitral area.

Aortic area.—Same as the pulmonary area.

Venous pulsation was visible on the neck but not very markedly.

Respiratory system.—On admission râles in the right chest, no cyanosis, respiration 68 per minute. The adventitious sounds disappeared on treatment but reappeared when bronchitis supervened. The baby lived for 40 days in the "Home" and during this period it had two attacks of bronchitis and ultimately succumbed to broncho-pneumonia. Its weight before death was 3 lbs. 6 ozs. (i.e., 1 lb. 2 ozs. less than its former weight).

Diagnosis.—Though the provisional diagnosis was given as double mitral affection of the heart, the differential diagnosis lay mainly between anæmia with functional dilatation, endocarditis, and malformation of the heart without cyanosis. Some of the signs and symptoms were common in all cases.

Treatment.—Œdema of the face and legs disappeared on sulphates and digitalis, but the effect was only temporary. Syrup of hæmoglobin for anæmia, and ung. hydragyri (to be rubbed over the abdomen); breast feeding by a wet nurse—6 feeds, three hourly. Grimault's syrup, when bronchitis supervened was used. Whole blood injection was done twice but the result was not satisfactory.

Case 2.—Gopal, male child, age 2 months, admitted on 11th May, 1929, weight on admission, 4 lbs. 2 ozs., died on 7th June, 1929.

General examination.—Baby highly marasmic, hæmoglobin 65 per cent., temperature daily intermittent, rising to a maximum of 99.8 to 101°F.; pulse 150 per minute, respirations 50 per minute, fissures round the anus, bridge of the nose flattened, no cyanosis or œdema of the legs except on the day of death, liver and spleen only palpable.

Circulatory system.—Pulse 150 per minute, regular, apex beat in the 4th space, anterior axillary line, forcible in character.

Mitral area.—The first sound is entirely replaced by a sharp systolic bruit conducted towards the axilla and upwards.

Second sound; the first part of the diastolic sound was distinctly audible but the last part of diastole was entirely replaced by a soft murmur which was continuous with the systolic bruit.

Pulmonary area.—The first sound was replaced by a sharp systolic murmur of less intensity than the mitral, but the second sound was distinctly heard.

Aortic area.—Same as pulmonary area.

Respiratory system.—Normal, except that the rate is slightly increased.

During the latter part of the treatment the whole of the diastole was occupied by a soft murmur. Swelling of the face and legs was noticeable only on the day of death.

Diagnosis.—A provisional diagnosis of mitral regurgitation was given.

Treatment.—Same as in Case 1.

Case 3.—Baby Bishnu, age 1 month 15 days, admitted on 24th June, 1929, weight on admission, 5 lbs. 2 ozs., died on 14th July, 1929; last weight being 4 lbs. 10 ozs.

General examination.—Anæmic, hæmoglobin 65 per cent., no evidence of congenital syphilis except the marasmic condition, no cyanosis or œdema of the legs; liver and spleen not palpable.

Circulatory system.—Pulse rate varying from 60 to 64 per minute, frequently irregular, 3 or 4 beats and one stop.

Mitral area.—Apex beat in the 4th space, nipple line, no forcible impulse. First sound soft; second sound fairly sharp.

Pulmonary area.—Both sounds are soft.

Aortic area.—Same as pulmonary area.

Respiratory system.—Both the lungs were free. The baby with such a low pulse rate (normal babies being 120 to 140) was getting on all right without any untoward symptom, but on the day of death it had a bath in the morning in the cold weather with too much handling and died suddenly in the afternoon.

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Provisional diagnosis.—Partial heart block (congenital).

Case 4.—Girl baby Kamala, age one month, pulse rate 156, respiration 28, marked cyanosis of the nails of the hands and feet and lips.

General examination.—On examination of the heart and lungs nothing abnormal was found except the very slow rate of respiration; the heart sounds were normal.

Since the patient is still living and is under observation nothing else can be written on the case at present.

Case 5.—A rather older baby, male, aged one and a half years, admitted on 1st August, 1929.

General examination.—Puffiness of the face and the extremities, abdomen distended, veins over the thorax and abdomen rather prominent, venous engorgement over the neck, bridge of the nose depressed, fissures round the anus.

Circulatory system.—Heart; apex beat in the fourth space, nipple line.

Mitral area; first sound replaced by a sharp systolic bruit ending in the sharp second sound, the bruit conducted towards the axilla and the back.

Pulmonary area.—Same as the mitral area, but of less intensity.

Aortic area.—Same as the mitral area but of less intensity, no conduction towards the carotids.

No impulse at the apex beat, but venous engorgement of the neck present, pulse rate 88, regular.

Respiratory system.—28 per minute.

Right lung; a few rhonchi.

Left lung; clear.

Liver and spleen not palpable.

Blood report.—Hæmoglobin, 65 per cent.; leucocytes, 7,500 per c.mm.

Urine report.—A trace of albumin.

The case is still under observation.

In conclusion my submission is that such cases of heart affection in babies are quite common, but their diagnosis and proper treatment are extremely difficult to a general practitioner, and truly speaking require the help of some cardiologist.

Any suggestions and advice will be most welcome to the writer.

FOUR CASES OF PLAGUE TREATED WITH "BAYER 205."

By G. W. VINCENT,

MAJOR, I.M.D.,

Retired Civil Surgeon, Maymyo.

HAVING read in the February number, 1926, of the *Transactions of the Royal Society of Tropical Medicine and Hygiene*, of the good results obtained by Dr. Dyce Sharp in the treatment of plague with Bayer 205, I resolved to get a small quantity for trial when an opportunity offered. In August 1927 a severe epidemic of the disease was at its zenith and on the 19th I was asked to see a small boy who had the disease. The following are the particulars.

Case 1.—A. K., aged 7 years, ill two days, seen on August 19th at 10 A.M., temperature 102°F., tenderness in the left axilla where a small gland can be felt, expression frightened and anxious. As there had been several cases of plague in the locality a diagnosis of plague had been made early. 0.2 gram "Bayer 205" dissolved in 2 c.c. freshly distilled water was injected into the median basilic vein with the usual antiseptic precautions; some difficulty was experienced as it was so small. Evening temperature 103°F., pulse 120, restless, complained of headache, advised sponging frequently if the child was awake during the night. August 20th, morning temperature 99°F., expression cheerful, calling for drinks, a large soft bubo has appeared in the opposite axilla, painless to the touch. I was not called again but a week after the father informed me the child was up and about, that both buboes had disappeared and that he proposed sending the child to school. I advised a longer period of rest before doing so.

Case 2.—On the 27th August the younger brother of the first patient, aged 5 years, was attacked with a bubo in the right groin. Temperature 102°F. in the morning, same symptoms as the other child. Given an intravenous injection of "Bayer 205" 0.1 gram dissolved in 2 c.c. of distilled water. Two days later the temperature came down to normal, with complete recovery in 5 days.

Case 3.—An elderly Hindu lady aged 54 years, ill 3 days when I saw her. Temperature 102°F.; enlarged and tender gland in right groin, pulse 110 soft and easily compressible, semi-comatose. She had been under the treatment of another doctor till I was consulted. 0.9 gram of "Bayer 205" dissolved in 10 c.c. of distilled water was given in the usual way.

Evening temperature 103°F., pulse 105, better volume, advised sponging frequently till temperature came down.

Next morning temperature 99°F., better in every way. After this I did not see her again, but I was informed a week later that she was walking about.

Case 4.—A Mahomedan schoolboy aged 14 years of well-to-do parents, seen on the second day of attack, anxious and frightened look, small tender gland in left groin, morning temperature 103°F., pulse 100. As in the former cases was given 0.5 gram "Bayer 205" dissolved in 5 c.c. of distilled water.

This boy's case attracted some notice as a dozen of his relatives and intimate friends asked permission to witness the new remedy being given and the next and following days were gratifying in the results. The temperature gradually came down and in a week the boy was able to move about.

I was informed by the Health Officer who was in touch with all plague cases in the station that in his opinion "Bayer 205" gave the best results.

I may mention incidentally that about this time a case came to my notice of a healthy young Bengali who was diagnosed as plague on the first day of the disease. I understand that the following treatment was adopted. The bubo was excised, 60 c.c. of anti-plague serum was given intravenously on the first day and 40 c.c.

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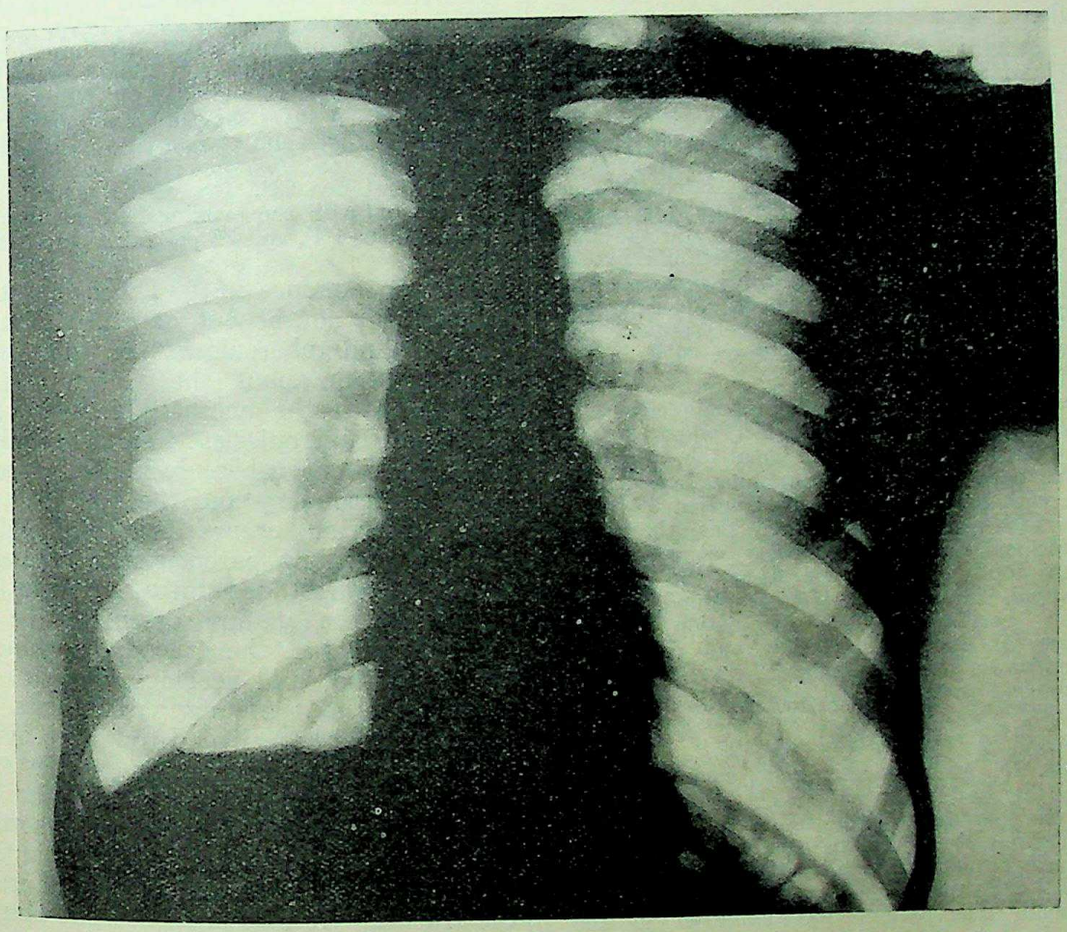
repeated in 6 hours. The temperature came down rapidly from 104 to 98°F.; the patient then collapsed and died in spite of the unremitting attention of his doctor and careful nursing in hospital.

THE EXISTENCE OF HILUM TUBERCULOSIS IN INDIANS.

By R. N. TANDON, B.SC., M.B., B.S., D.M.R.E. (Cantab.), T.D.D. (Wales),

United Provinces Medical Service, King Edward VII Sanatorium, Bhowali.

By "hilum tuberculosis" we mean tuberculous involvement initially starting in the area which is usually marked out as the "hilum" on an x-ray plate, and the area just adjoining it. We have included the adjoining area because great difficulties arise in defining "hilum" on an x-ray plate. The diagnosis of "hilum tuberculosis" came into vogue after the advent of x-rays. During the war increased striations in the region of the hilum on an x-ray plate were freely diagnosed as "hilum tuberculosis" sometimes even irrespective of the clinical condition of the patient. This diagnosis, and along with it the radiologist, fell out of repute, because cases diagnosed as such never developed any symptoms of tuberculosis in after life. And to-day the pendulum has swung to the other extreme; radiologists loathe the diagnosis of "hilum tuberculosis." A radiologist of great repute calls it a heresy of the radiologists. The existence of such a condition as "hilum tuberculosis" is denied. However it may be, we can find some who have faith in its existence. The late Dr. Clive Riviere gives a very vivid clinical picture of a case of "hilum tuberculosis" in his book *The Early Diagnosis of Tubercle.* There are others amongst the continental and the American workers who favour this view. In our present attempt at collection of the evidence for the existence of "hilum tuberculosis," or tuberculosis first starting in the hilum (radiological), we believe that it is particularly a comparatively common type of initial lesion amongst Indians who suffer from this disease.



Case 3.—A typical case of hilum tuberculosis.

The following cases are noteworthy amongst others not quoted. These cases fall under two groups. One group had the sputum positive for tubercle bacilli and therefore, without doubt, they have pulmonary infection. The other group had the sputum negative; but considering the circumstantial evidence, they are regarded as cases of pulmonary tuberculosis. In

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most of the cases no definite physical findings are available. In none of the cases is any radiological evidence of tuberculous infiltration in the parenchyma of the lung away from the "hilum" present. The only radiological fact noticed in common in these cases, is that every one of them had rather a prominent "hilum." The extension sometimes was apparent upwards and in others outwards. Most of the shadows were non-pulsating and showed very little movement on deep breathing. In some cases unilateral restriction of diaphragmatic movements was seen, corresponding with the affected side. In one case the movement was peculiarly jerky on the affected side, while the contralateral leaf of the diaphragm was moving freely. In a few cases movements of both leaves of the diaphragm showed rather restricted movements. Some cases showed no restriction of movements on either side.

Case 1.—S. D. S., Hindu, a female aged 17 years. The patient noticed an abscess in the back (lumbar region) which was diagnosed as Pott's disease. In September 1929 the patient started getting cough and sputum with fever which used to go up to 101°F. The patient stayed in bed all this time. In March 1930 she was admitted to the Sanatorium. On admission *x*-rays showed involvement of the left "hilum" and the area just adjoining it. Physical signs were definite in the left interscapular and the infraclavicular regions. The sputum was positive for tubercle bacilli. The patient has been treated with sanocrysin, the sputum has become negative but a temperature above 99°F. in the evening persists.

Case 2.—T. K. F., Mohammedan female, aged 16. The patient was well till February last, when she got attacks of fever rising up to 103 or 104°F. which is said to have been controlled by quinine. Again she went down with fever in March 1930, which was not controllable with quinine. Her blood this time was examined for malaria and microfilariæ but was found negative for both. After some time the patient developed cough with sputum which was found positive for tubercle bacilli. Physical examination showed definite signs in the infraclavicular, and the interscapular regions on the right side. *X*-rays showed a heavy hilum shadow on the right side with some extension upwards. The patient is on sanocrysin and artificial pneumothorax and is doing well.

Case 3.—Z. K., Mohammedan male, aged 30 years, employed in the army. The patient got sudden attacks of hæmoptysis four times within a few days in March 1929, bringing out about 2 ounces of blood each time. After a month he started cough with fever. He used to get a little sputum which was found positive for tubercle bacilli. The patient was admitted in the Sanatorium in July 1930. On admission the sputum was still found positive and his temperature used to go up to 99°F. in the evening. No physical signs of disease could be found in the chest. *X*-rays showed heavy "hilum" shadows on both sides, bilateral restriction of diaphragmatic movement. The intradermal tuberculin test was + +.

Case 4.—F. B. C., a medical student, Mohammedan male, aged 26 years. The patient was well till March 1929 when he got attacks of coryza and more or less persistent cough with some sputum, and a little fever in the evening. In July 1929 he had a hæmoptysis about 4 ounces in quantity and was admitted to the Calcutta Medical College Hospital. His sputum was examined and was found positive for tubercle bacilli. In the middle of this year he was admitted to the Sanatorium. No physical signs of disease could be found in his chest. The sputum was negative for tubercle bacilli, as a matter of fact he was now getting only a little mucoid sputum. His temperature in the evening still persisted at 99°F. *X*-rays showed both "hila" involved, especially the right. Movements on both sides of diaphragm were restricted.

Case 5.—B. C. G., Hindu, aged 20. In June 1929 when in Calcutta, the patient got a hæmoptysis, about 4 ounces in quantity and followed by stained sputum for 3 or 4 days. The patient started getting fever in the evening and cough followed. He was admitted to the Sanatorium in August 1929 and *x*-rayed, when "hilum" involvement on the right side was found. Physical examination showed indefinite signs in the right apex. The sputum has always been negative for tubercle bacilli. He is apyrexial now and taking long walks. The intradermal tuberculin test is (+ +). Blood sedimentation test (Westergren) first hour is 9 mm. Von Bons' Dorff Count is 251.

Case 6.—R. R. T., Hindu male, aged 26 years. Patient was well till the first week of December 1929, when he started coughing and got stained sputum occasionally. This went on for a couple of months, when the patient discovered that he was running a temperature of about 100°F. in the evening. On admission to the Sanatorium in the month of April 1930, indefinite physical signs in the right apex, with an evening average temperature and pulse of 99.4°F. and 100 per minute respectively, were found. *X*-rays showed prominent "hila." The intradermal tuberculin test was (+). Blood sedimentation test for the first hour was 2.5 mm. Von Bons' Dorff Count was 238. On discharge the temperature and the pulse in the evening had come down to an average of 98.4°F. and 72 per minute respectively.

A brief reference to the pathogenesis of tuberculosis will not be out of place here, to show that "hilum tuberculosis," or tuberculosis first starting in or about the "hilum," is quite in keeping with the accepted theories of pathogenesis of tuberculosis. Renke has divided the pathogenesis of tuberculosis into three stages, primary, secondary and the tertiary. The primary infection occurs in childhood, mostly through the lung parenchyma; the result of which, as Parrot described it, is the "primary complex," the glands draining the infected parenchyma, i.e., the tracheo-bronchial glands swell and the child becomes allergic. The site of invasion of the lung parenchyma is afterwards marked by calcified nodes. This primary phase may heal or pass on to the secondary stage. The secondary stage may be anything between a localized adenitis and miliary infection. When it is a localized adenitis the infection lurks in the glands at the bifurcation of the trachea. It may heal at that stage or the infected glands may allow the surrounding tissue to be invaded, and give rise to infection of the parenchyma in the "hilum" and cause clinical "hilum tuberculosis." As a rule the secondary phase passes without any ill-health and the patient gets over it without knowing. Then the tertiary stage comes in when re-infection occurs, and this typically does so in the apex of the lung. While in an overwhelming majority of patients the first infiltration of pulmonary tuberculosis starts in the parenchyma of the apex, there are a few in whom the starting point is the parenchyma of the lung in parts other than the apex of the lung. Thus it may start in the middle or the basal part of

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the lung. It is apparent therefore, on theoretical grounds, that the parenchyma of the lung in or about the "hilum" may as well be the site of first infiltration. So that the "hilum" may be the first site of tuberculous involvement in the secondary and the tertiary stages of the disease.

The first infiltration having been established, the question arises how it advances in the parenchyma of the lung. It has been suggested that the flow of the lymph stream is reversed as it happens sometimes in cancer, and the infection travels from the "hilum" towards the periphery. This may be so, however there are at least two other methods, i.e., through direct contiguity and the bronchi, which can easily explain this centrifugal spread.

Conclusions.

(1) The "hilum" may be the first site of tuberculous infiltration in the clinical manifestation of pulmonary tuberculosis; and it is particularly comparatively so amongst Indians. It will be desirable to point out that it is not argued that every person who has radiologically rather a prominent "hilum" is a case of "hilum tuberculosis." Far from it, but a doctor who is in the habit of ignoring these prominent "hila" as normal to every town dweller will be far from right.

(2) That the first lesion occurring in the parenchyma of the "hilum" is quite supported on pathogenic grounds.

(3) Physical signs in the apex on the side, the "hilum" of which is diseased, may be found, without any radiologically demonstrable lesion in the apex itself.

I am greatly indebted to Dr. R. K. Kacker, Superintendent, King Edward Sanatorium, for kindly allowing me the publication of the above cases.

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UNSUSPECTED SOURCES OF LEPROUS INFECTION.

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EVERYBODY thinks himself to be at a safe distance from leprosy without knowing where he stands. The general opinion is that it is only to be found among the beggars and the lower class people, that it is an hereditary disease, it visits only those who have sinned in their life, and that the workers in connection with a leprosy clinic are the most likely persons to get this disease. So that anybody not included in these classes thinks himself to be quite safe and immune, and when the disease is diagnosed in him it becomes a hard task to convince him that he is infected, especially when there is no family history.

Times without number workers in leprosy are advised by their friends and relatives to give up this line and choose something better and safer, doctors are seen to enter the laboratory with trepidation, students of special classes develop lepraphobia after attending a few lectures on leprosy, and the public always shuns the place where an asylum or a clinic is situated as if those buildings are teeming with acid-fast bacilli which may accidentally jump on to the shoulder of an unwary passer-by. But is it a fact that persons working in connection with a leper clinic are in more danger than those who are outside it? Is there any guarantee that the disease will not visit those who are better placed in life, or who have got no hereditary taint or who have never sinned in their life? In the subsequent pages we shall cite some cases to show how fallacious is the general opinion about the occurrence of leprosy and how unsafe is the position without a clear idea about this disease.

TABLE I.

Social status of patients.

A 1 and A 2 = Non-infectious cases.
B 2 = Highly infectious.
B 1 = Slightly infectious.
B 3 = Very highly infectious.

Name.	Type.	Status of life.
P. C. R.	A 2	Professor. No family history.
J. N. D. G.	A 1	Professor of Mathematics. No history of contact.
R. C.	A 2	Physician outside leprosy clinic.
J. B.	B 2	Assistant Surgeon, outside leprosy clinic.
B. G.	A 1	Clerk of a paper mill.
K. G.	A 1	Owner of an agricultural industrial concern.
D. M.	B 1	Retired Sub-Registrar.
B. B.	A 1	Sanskrit teacher.
R. S.	A 2—B 1	Preventive officer.
J. B.	A 1	Son of an Anglo-Indian chargeman.
C. C.	A 1—B 1	Clerk, Municipal Office.
J. B., D. B. and their mother.	A 1 cases	Bengali, Hindu family.
I. C. M.	A 1	Veterinary Assistant Surgeon.
B. K.	A 1	Military Accounts Officer.
L. S.	A 1	School student.
S. C.	A 1	Pleader.
P. K.	A 1	Post-graduate student.
M. C.	A 1	Contractor, Railway Catering.
Mrs. D.	A 1	Mother of a doctor.
J. A.	A 1	Overseer of a press.
S. R.	A 1	Clerk, Excise Department.
M. G. P.	A 1	Girl typist of a Tobacco Co.
L. C.	A 1	Daughter of a doctor who himself is a B 1 case.

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TABLE I—*concld.*

J. N. S.	A 1	Clerk, Audit.
P. S.	B 2	Artist.
R. H.	A 1	Record-keeper, Judge's Court.
A. C.	B 1	Kabiraj (Physician treating with indigenous drugs).
S. K.	B 2	Daughter of a librarian.
P. G.	A 1	Clerk of an oil mill.
B. M.	B 2	Travelling Inspector of a Railway Co. He travels in a second class compartment.
W. P.	B 1	Student.
R. G.	A 1	Sub-Inspector of Police.
G. R.	A 2	Cloth merchant.
Mrs. T.	A 1	Wife of an Anglo-Indian Foreman.
S. A. O.	B 1—B 2	Editor of a newspaper.
F. C. D.	A 1	Clerk, Insurance Co.
M. A. M.	A 1	Rice merchant.
G. B.	B 3	Expert musician of a Cinema Co., and supervisor of the band party.

Without dilating further I wish to point out that we can trace this disease along among the rich people like zemindars, high class merchants and other big families. As regards race, none is immune. This disease has a tendency to universal distribution. It shows no distinction of caste or creed, no tenderness for age, no preference for sex or beauty. All these clearly show that as it is a disease of contact, so long as this one factor remains, this disease will invade any susceptible person without respect to all other factors, if the personal prophylaxis is unheeded. But how do the middle and higher class people get this contact against all calculations of safety?

Illustrative cases.

Case 1. *A boy and his servant.*—A Chinese boy, of 2 years age, was one day found on the lap of a B 3 case, while the servant in charge of the boy was sitting near by. On enquiry we came to know that a Mahommedan gentleman without any issue had adopted this Chinese boy and the boy was sent out for airing in charge of the servant. The servant happens to be a friend of this leper who is a day labourer and they meet almost daily. So this ignorant boy under the care of a foolish servant has had dangerous contact without knowledge of his parents, who will look askance when the disease develops in their son. Among the well-to-do families it is a common custom to keep their children under the care of servants or maidservants who themselves may be innocent-looking lepers, or who may meet some leper friends which will be the source of entrance of this disease in their family although there may not be any previous history.

Case 2. *Contaminated fruits.*—A very bad B 2—B 3 case of leprosy with nodules on the face and ears was found sleeping in front of a house one afternoon, and a woman fruit seller was sitting with all her commodities arranged on the ground close by this infectious leper. Some of the buyers were seen to eat these fruits without ever washing them in water, and among the buyers were found all classes of people because nobody noticed this leper as he had no deformities or ulcers. Therefore the chance of contracting infection remains the same so long as we go on recognising leprosy by name only and not by sight.

Cases 3 *to* 6. *Cooks* (3) R. S. This is a B 3—A 2 case and he has been suffering from the disease for one year. He happens to be the *bawarchi* (cook) of a European officer in the Port Commissioners' Office. A smear from his left cheek is strongly positive (+ + + +).

(4) Abraham. Cook of a European officer in a jute mill. This is a B 2 case. A smear from a patch on the face is positive (+ +).

(5) S. Rao. Cook of a Mahommedan lawyer, son-in-law of a late Justice of the High Court, and unfortunately this is a B 3 case.

(6) H. R. He is a cook in the house of a Marwari gentleman. This is a B 3 case and he is suffering from this advanced condition for six months. Smears from the nose and skin of the forehead are strongly positive. Nose + + + +. Skin + + +.

Unfortunately the lepra bacilli are tasteless, otherwise the masters of these cooks could get an idea of what dangerous food they are being served with.

Persons selling different kinds of foods.

Cases 7 *to* 19. (7) Adhar. This is a very bad case of leprosy. On taking the history we came to know that he is a veteran fruit seller of a Calcutta market. Smears from the skin and nose of this patient are strongly positive. Nose + + +. Skin + + +.

(8, 9) S. K. and J. The former is working in a grocer's shop in the district of Nadia (Bengal) and the latter in Bhowanipur, Calcutta. Both of them are B 2 cases and smears from their skin are positive (+ +).

(10) Modak. This is a B 2 case and he is working in a sweetmeat shop in Calcutta as a salesman.

(11) A. K. J. A 1 case. He is working in a butter shop in a market, Calcutta.

(12) Kokil. B 3 case. He is a fisherman. Nose + +, left ear + + +.

(13) Mr. H. A 1 case. He is working in a hotel in Calcutta.

(14) S. P. This is a B 3—A 2 case. Smears from the nose and skin are strongly positive. (Nose + + + +, right ear + + +.) He is selling *pan* (betel leaf) in a market in Calcutta.

(15) S. C. P. A 1 case. He is working in a tea-stall.

(16) Narendra. A 1 case. He is working in a cold drink restaurant.

(17) M. A. He is working in an ice factory. This is a B 2 case. Smears from nose and skin are positive. Nose +, right ear + +. Persons addicted to iced drinks should note this case.

(18) R. H. Sells pickles in the streets of Calcutta. This is a B 2 case and smears from the nose and skin are positive (nose +, left eyebrow + + +). School-boys are very fond of pickles.

(19) Goala, a milkman from the northern part of Calcutta was found to be a B 2 case. He used to supply milk to the houses of many residents in that locality.

Servants and Maidservants.

Cases 20 *to* 37. (20) A. G. Orderly of an income-tax officer. This is a B 3 case and he has been suffering for three years. Smears from nose and skin are positive (nose + +, right ear + +). Our insurance receipts pass through the income-tax office and may become contaminated.

(21) S. R. B 2 case. He is a doctor's servant.

(22) R. M. Durwan of a Rai Bahadur. This is a B 2 case. (Nose +, right arm +.)

(23) A. K. Orderly of a Senior Registrar of a High Court. This is a B 2 case and a smear from a patch on the face is positive (+ +).

(24) Kuber. A servant supplying drinking water to the officers of a limited company. This is a B 3 case. We are sure that these officers regard themselves as safe as anybody else.

(25) L. S. Durwan. This is an A 1 case.

(26) Jumma. Orderly of Mr. T., an aeroplane pilot. This is an A 1—A 2 case. The pilot is in danger of becoming infected.

(27) R. H. Orderly, Divisional Superintendent's Office, Accounts Section. This is a B 2—A 2 case.

(28) Nanka. A 1 case. He is living with a durwan of the Imperial Bank.

(29) Sk. K. M. A 1 case. Orderly, Writers' Buildings.

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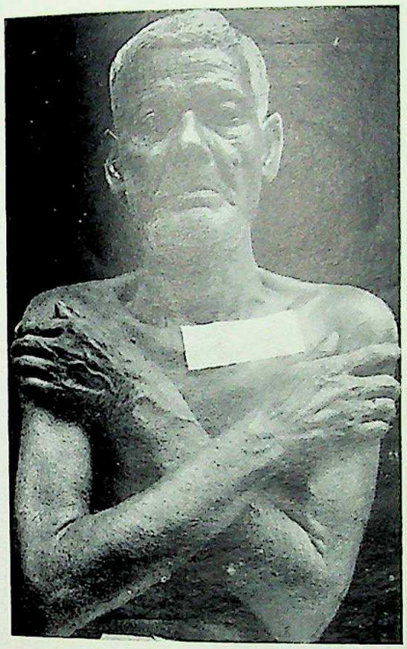
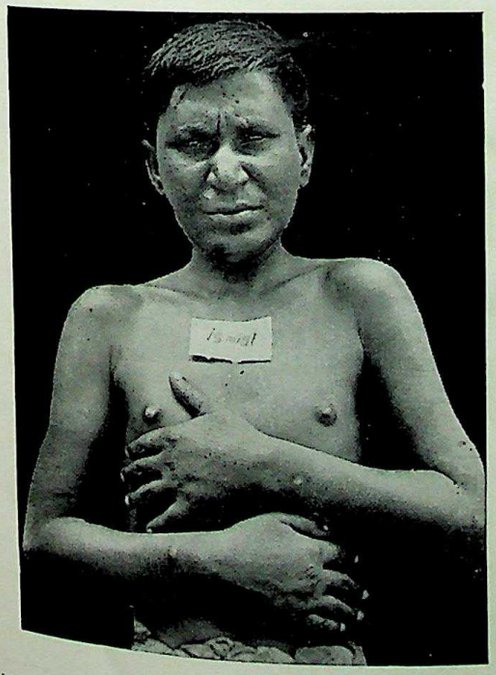
PLATE I.

Case No. 2.



Case No. 3.

Case No. 38



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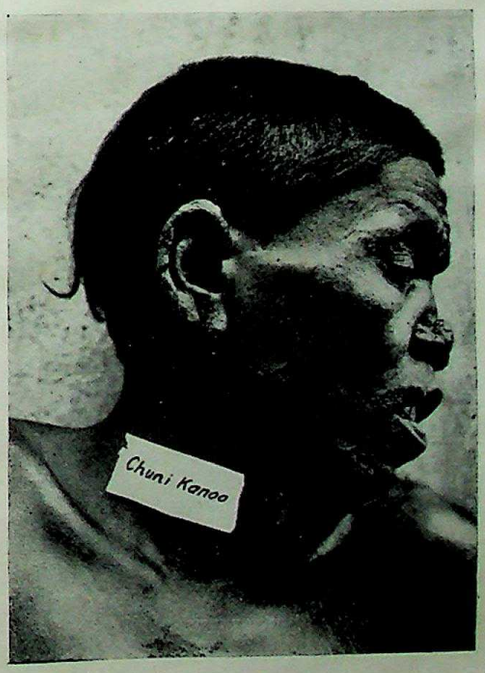

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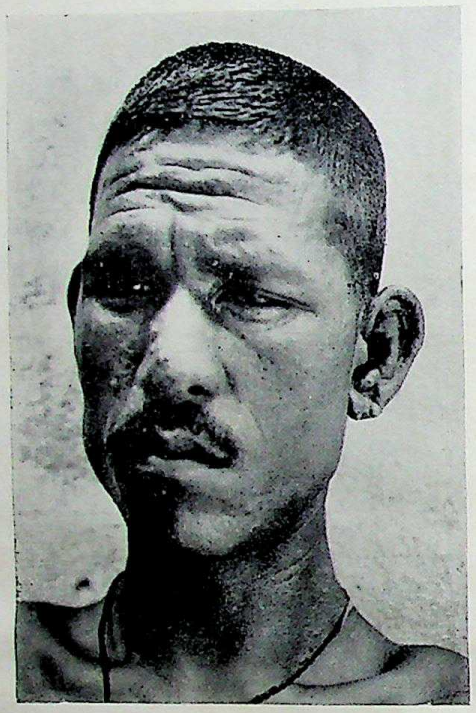
PLATE II.

Case No. 47.



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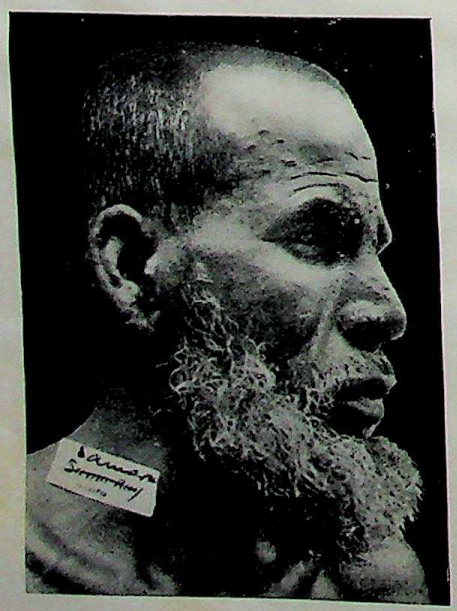
Case No. 51.



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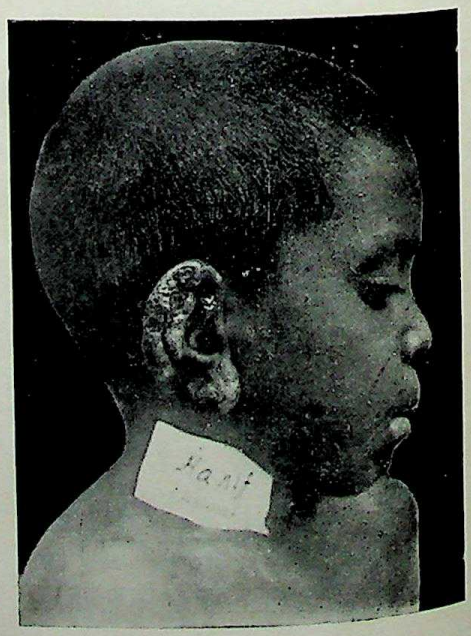

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(30) Niroda. A 2—B 1 case. She is a maidservant.

(31) S. K. A 1 case. He is a club servant.

(32) S. P. A 1 case. He is a bearer.

(33) P. S. B 1 case. He is a chauffeur to a European gentleman residing in a big hotel in Calcutta.

(34) B. R. A 1 case. Outdoor durwan of a medical college.

(35) M. B. Massalchi (cook's mate) to a Chief Medical Officer. Service for 17 years, disease for 7 years. This is a very bad B 3 case. Nose + + + +, right ear + + +. A massalchi is a servant who washes plates and dishes.

(36) K. A. A 1 case. Orderly.

(37) H. M. A 1 case. A club servant.

Persons of different professions.

Cases 38 *to* 58. (38) Peary. A 2—B 2 case. A smear from the left side of the forehead is positive. She is a Hindustani *dai* (midwife) and she renders her services at the time of childbirth. The middle and even higher class people employ these *dais*.

(39) R. M. This is a B 3 case, and the smears from the nose and skin are positive (nose +, right ear + +). He is a pillow maker.

(40) R. P. A 1—B 1 case. He is a washerman of Bhowanipur (Calcutta).

(41) Jagan. This is a B 3 case. He is a cobbler by profession. He repairs old shoes and makes new ones.

(42) G. H. B 2 case. Right ear + +, nose +. He is a barber. In some instances the barber himself may not be a leper but he may shave an infectious leper along with his other customers. One barber is known to shave daily an infectious leper, in spite of being warned by the neighbours, for he receives better remuneration from this leper.

(43) S. K. H. A 1 case. He is the owner of a hair-cutting saloon. He offered his services to the writer as an expert hair cutter but unfortunately they could not be accepted. But we are sure that scores of person will have their hair cut or be shaved by this leper even when he passes into the "B" stage of leprosy.

(44) N. Ahammad. B 2 case. Nose +, left forearm + +. He is a shopkeeper in a market in Calcutta.

(45) Ismail. This a B 3 case. Nose + + + +, left ear + + + +. He is working in a jute mill with 12 other persons but possibly he is infecting many multiples of 12.

(46) C. K. This is a B 3—A 2 case. Ulcer of the left hand + + +, ulcer of the right great toe + +. He is a bullock cart driver. As he is still carrying on his work this shows that nobody is noticing anything the matter with him; on the other hand whatever he is touching or wherever he is setting his foot he is leaving something for his followers.

(47) Sadagar. B 2—A 2 case. He is a bullock cart driver. In spite of anæsthesia in his left foot and leg the ulcer on his left foot is strongly positive (+ +).

(48) B. J. B 2 case. Nose + +, right ear + +. He is a trollyman to a District Engineer.

(49) J. B. B 2—B 3 case. He is the night watchman to a market in Calcutta. In spite of all watching the thief has entered into his body. The night watchman has got the privilege to sit in any shop he likes and thus to mix with sellers and customers equally.

(50) S. A. B 3 case. Nose + + + +. Right ear + + + +. He is working as a spinner in a jute mill. He had an attack of smallpox in childhood which has disfigured his face. Leprosy is superimposed over that. The change in the appearance produced by leprosy was being regarded as the end result of smallpox. This impression was so very strong in the mind of his office master that he could not believe the diagnosis of our survey officer.

(51) Gopaloo. B 3 case. He is a sweeper by occupation. Is he sweeping a place clean or making it more dangerous?

(52) Miss B. A 1 case, booking office clerk.

(53) Sibraj. B 3—A 2 case. He is a postman.

(54) L. M. A 1—B 1 case. He is a priest.

(55) K. C. B 3 case. He is hawker of stationery articles like threads, tapes, hair pins, etc.

(56) B. T. A 1 case. Tramcar driver.

(57) R. P. B 2 case. Nose +, skin + +. He is a tram car conductor. So we have leprosy on the fore-front and leprosy behind to carry the passengers safely to their destination. Besides these, infectious lepers are often found travelling in public vehicles.

(58) Hawker. A B 3 case with cracks and fissures all over his body from which discharges were coming. He was found making door mats and selling them from house to house.

Teachers.

Cases 59 *to* 60. 59 B. M. B 3 case. Nose + +, skin + +. He is a teacher of a municipal Free School (Bengal) and for the treatment of his disease he is at present residing in a hostel for the students of a normal training school. So that he is infecting the boys as well as their would-be teachers.

(60) This is a B 3 case. He was looking like an over-ripe mango with numerous cracks and fissures on his body and extremities from which discharges were coming out continually. The ulcers on the toes and fingers were strongly positive for acid-fast bacilli. He is a District Board teacher. There are 30 boys under his care. Never before have we seen such a highly infectious case holding such a responsible post. The boys as well as their guardians will learn the best lesson in their life if some of the boys become lepers owing to this contact with their teacher.

Indirect sources.

(61) This boy is a highly infectious case of leprosy (B 2—B 3). His father is the cook of a District Magistrate and his mother is doing similar work in the house of a Police Inspector in the same locality. He is the only child in their house. His parents are free from leprosy but we cannot expect that this young boy will be staying in a lonely house when his parents are away at work. He must be visiting both the houses of these officers and may be playing with their children. As he is the only son of his parents he is likely to be caressed by his parents while they are discharging their own duties. On taking the history we found that our surmises were correct. This case was reported in the *Statesman* some time back by Dr. Muir.

Besides these cases, infectious lepers are found to visit many restaurants or to stay temporarily in hotels in Calcutta. The practice of feeding the poor always invites lepers to the door. Beggar lepers of the infectious type are seen to handle the water taps in the street and to buy their necessary articles of life in exchange for their earnings, and we cannot be quite sure that these infected coins will not be coming into our pockets during a similar exchange.

After studying all these cases, is there anybody who can think for a moment that that he is quite safe from contact with a leper? The chances of infection remain at all ages and in all times, especially in towns where close mixing with different kinds of people is bound to occur daily. So that by simple fear of the disease or loathing of the poor sufferers we cannot gain anything. In order to save ourselves from this dangerous disease we should have a clear idea about it in all its aspects.

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This disease enters the body like a thief without raising any alarm (unlike many other diseases) so that a leper may be harboured in a house for years together, although the mere name of the disease will frighten people to death. In the A1 stage the disease is overlooked in most cases, and often the diagnosis is not relied upon. In the B2—B3 cases it is regarded as some disorder of the bile and blood, and it is only in the A2 stage that the patient is treated with loathing and the disease is diagnosed as true leprosy. Another erroneous idea that exists regarding leprosy is that this disease is said to visit only those persons who have suffered from syphilis or gonorrhœa. So that people usually become ashamed of this disease because the declaration of leprosy means many things.

Among all diseases this is regarded as the worst of its kind in all countries and in all communities. People would rather have any other disease than leprosy. On this account not only the patients but the doctors in this subject as well are ostracised.

Recently we have received information from a fellow worker in charge of a leper clinic that the letters sent by him are touched with great caution by the authorities concerned. He is received with disrespect and fright when he goes to his master's house as if he carried leprosy in his pocket. Doctors of the same place also are known to laugh at him as if he is an inferior being, although the treatment of leprosy is privately carried out by all of them when it becomes a paying concern.

So far we have seen that the majority of the sources of contact are outside a leprosy clinic, and most of the sufferers have got no family history. Although most of them are not connected with any medical institution and although they are full of fear of this disease and still they have got it, the reason why leprosy workers rarely get this disease through their work is the fact that they readily get into the habit of personal prophylaxis. So that there is a difference between coming in contact with a leper after knowing him to be one, and coming into contact with an unsuspected case. The eagle's eyesight that is developed among the workers in this line that identifies any suspicious case at a glance from a distance cannot be expected in any outsider, so they cannot take any precaution either before or after contact. As long as this ignorance mixed with loathing and unreasonable fear remains as it is leprosy will go on trespassing into our houses although we may think ourselves quite safe and above contracting such a humiliating disease as leprosy.

My thanks are due to Dr. E. Muir, M.D., F.R.C.S., for his kind encouragement and permission to publish this paper, and to Dr. J. M. Henderson, M.B., CH.B., for the suggestions I have received from him.

SOME OBSERVATIONS ON HUMAN AMŒBIASIS.*

(BEING AN ANALYSIS OF POST-MORTEM FINDINGS IN 426 CASES.)

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and

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IN a communication(1) in the *Indian Medical Gazette* by one of us (P. V. G.) a rough analysis of all post-mortems recorded in the Pathology Department, Grant Medical College, Sir J. J. Hospital, Bombay, was published with a view to comparing the findings with those published by Sir Leonard Rogers in the *Glasgow Medical Journal*. It may be recalled that out of the total number of post-mortems 13.80 per cent. were cases of tropical diseases, of which amœbiasis alone formed 7.2 per cent. It is not inaccurate to state that amœbiasis is the only important tropical disease commonly seen in the post-mortem room in Bombay. During the last five years we have had the opportunity of conducting a fairly large number of detailed post-mortems on cases of amœbiasis.

With the help of the knowledge so obtained we have analysed the records of the past forty years, the results of which are embodied in this paper; we hope that material so collected will prove interesting and instructive.

The present series comprises 426 cases, of which 169 exhibited hepatic lesions and 257 intestinal lesions only.

For purposes of this paper we propose to divide our observations into the following two sections:—

I. General considerations.—Incidence of (*a*) intestinal, (*b*) hepatic, (*c*) total amœbiasis as related to (*i*) temperature and the rainfall, (*ii*) age, and (*iii*) sex; and

II. Amœbiasis of the liver.

I. *General considerations.*

In amœbiasis which is rarely an acute disease, the study of seasonal variation is obviously difficult. On a close study of the incidence of this affection in Bombay we are led to think that some seasonal variation does occur. From a table given elsewhere it will be seen that the average duration of symptoms varies from one to four months, thus giving a chance for the overlapping of the incubation period, the period of the actual infective stage and the period in which complications arise, in successive cases. There is only one case in this series in which the duration has been two years and a half.

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*A paper read before the Grant College Medical Society on 21st November, 1930.

(1) P. V. Gharpuré. Pathological evidence bearing on the incidence of diseases in Bombay. *Indian Medical Gazette*, No. 5, May 1928, Vol. LXIII.

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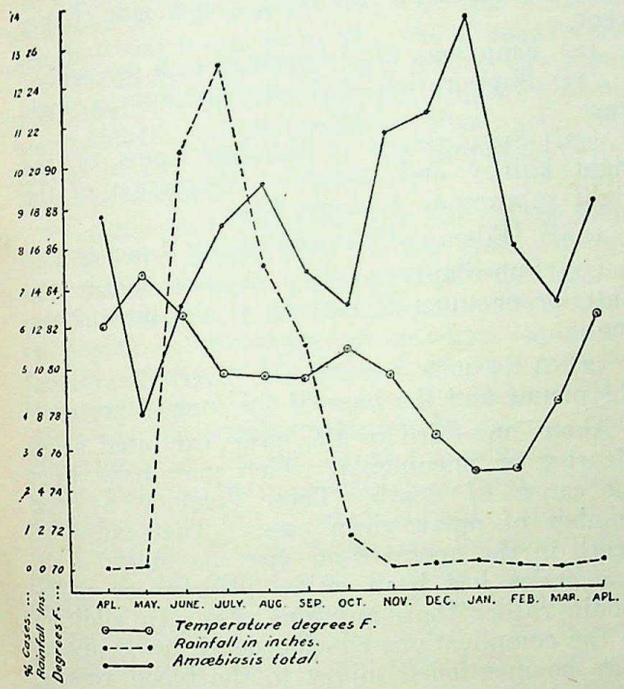
Considering the generality of cases with one to four months' duration, and studying the incidence of cases as occurring in particular months, as also the average temperature and the rainfall figures for those particular months, one gets some idea of the possibility of a seasonal variation in this disease, as will be seen from the graph attached (Graph 1). From the graph it will be observed that the incidence of the disease reaches its maximum between November and January, when the temperature is low and the rainfall low or none.

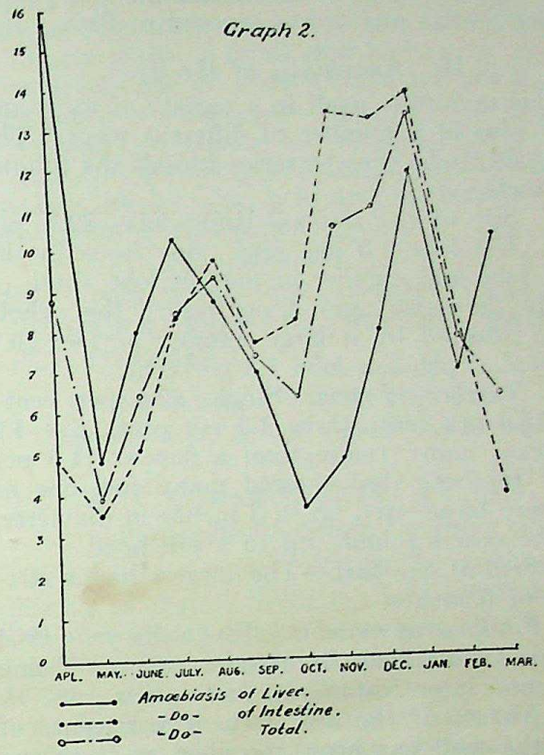
Graph 1.



Graph 2 shows that the different forms of amœbiasis have the same incidence in different months.

The period of twelve months can be divided into three periods:—(1) June to August, the Bombay monsoon, when fly breeding is at its height, as the period when spread of infection takes place, (2) September to November when the infected cases are running their course, and (3) November to January when the highest number of deaths occur. The latent or very mild cases occur during the rest of the year and supply the source of infection for the subsequent year. If it is taken for granted that the above argument is true, it may be suggested that the incubation period is about the same length as the period of the actual diseased stage, when the symptoms are produced and death sometimes take place. The findings in this paper refer to the fatal cases only. We are of opinion that in the fatal cases, both in the complicated and the uncomplicated, the average duration is the same, not exceeding six months. Thus judging from these data obtained from fatal cases, it may be pointed out that the maximum intensity of infections with amœbiasis in Bombay is during the months of June, July and August.

Graph 2.



The following table gives the age incidence:—

AGE INCIDENCE.	PERCENTAGES.		
Age.	Amœbic dysentery. 257 cases.	Liver abscess. 169 cases.	Total. 426 cases.
Below 10	0.9	0.0	0.6
11 to 20 ..	12.5	6.1	9.6
21 to 30 ..	32.8	37.0	33.3
31 to 40 ..	28.5	39.8	32.6
41 to 50 ..	17.4	9.7	15.6
51 to 60 ..	4.8	6.0	5.6
61 to 70 ..	2.7	0.7	2.1
71 to 80 ..	0.4	0.7	0.6

The highest mortality is between 21 and 40 years. Here again it is necessary to point out that we rarely get cases from the children's hospital for autopsy.

The following table gives the sex incidence:—

SEX INCIDENCE.	PERCENTAGES.		
Sex.	Amœbic dysentery. 257 cases.	Liver abscess. 169 cases.	Total. 426 cases.
Male ..	90.6	97	93.8
Female ..	9.4	3	6.2

By far the commonest are the male cases. This is probably due to the fact that males being outdoor workers depend for their food on

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local "hotels" and "tea-shops" which are not well protected from the health point of view. It is a common sight to see hundreds of people eating sweets and fruits exposed to flies.

II. *Amœbiasis of the liver.*

This manifests itself in a variety of ways and ends also in a number of different ways. The analysis of the present series reveals the following facts:—

1. *Site of the lesion.*—Right lobe 82.7 per cent., left lobe 1.3 per cent.; one focus in the right lobe and another in the left lobe (both of nearly the same age) 4 per cent.; the whole organ affected by a large number of foci 10.7 per cent., Spigelian lobe 1.3 per cent.

2. *Number of foci.*—Single 62.4 per cent., two 15.6 per cent., three 4.9 per cent., five 4.9 per cent., many (more than a dozen) 11.5 per cent. In those that showed many foci one or two were large sized up to 3 inches in diameter, and the others minute up to a pin head.

3. *Size of the foci.*—The largest had a diameter of 6 inches.

4. *Findings of amœbæ.*—Up to the year 1904 the notes described *Entamœba coli* as being found and later *Entamœba histolytica.*

5. *Nature of the wall.*—In 5 per cent. of cases the wall has been described as thick, up to ½ inch, consisting of dense and firm white fibrous tissue.

6. *Operation.*—Thirty-three per cent. had been operated on by the open method; of these three are interesting as the incision had only been in the empyema, the liver condition being left untouched in spite of the diagnosis of "liver abscess." The diaphragm was intact. Of the whole series only four had been treated by repeated aspiration, all these cases being prior to 1900.

7. *Complications.*—(*a*) Terminations of the "abscess" itself:—

(*i*) Bursting into the peritoneal cavity and producing acute generalized peritonitis, 9 per cent.

(*ii*) Bursting through the diaphragm and causing empyema, 8 per cent.

(*iii*) Bursting through the diaphragm and causing abscess in the lung, 9 per cent.

(*iv*) Through the diaphragm into the mediastinal tissues, 4 per cent.

(*v*) Bursting through the diaphragm into the pericardium, in three cases.

(*vi*) Bursting through the body wall on to the surface, in a single case.

(*vii*) Bursting extra-peritoneally and pointing along the psoas muscle, a single case.

(*viii*) Bursting into the stomach and draining away completely, two cases, both of the left lobe.

(*ix*) Bursting into the small intestine, into the jejunum just beyond the duodenum, a single case.

(*x*) Bursting into the peritoneal cavity and causing local peritonitis, two cases.

(*b*) Besides these conditions, most of which can be classified as fatal terminations, there are a large number of pathological conditions noted in the viscera surrounding the liver which also are responsible for death.

In all the following the "abscess" in the liver, and the diaphragm were intact, and the processes in the organs near by had been produced by lymphatic communication.

(*i*) Acute pleurisy, right side, 14 per cent.

(*ii*) Pneumonia of the right lung, most marked in the base, 18 per cent.

(*iii*) Acute peritonitis (no intestinal perforation), 8 per cent.

(*iv*) Abscess of the lung, right side, 6 per cent.

(*v*) Empyema of the right side, 5 per cent.

(*vi*) Suppuration of the mediastinum, a single case.

(*vii*) Suppuration at the upper pole of the right kidney and complete destruction of the right suprarenal, a single case.

(*viii*) Œdema of the right lung, 3 per cent.

(*ix*) Sub-diaphragmatic abscess near the anterior or superior surface of the liver, 2 per cent.

(*x*) Adhesions binding the liver, diaphragm, the pleura and the base of the lung, 2 per cent.

About one-third of the cases exhibited acute pleurisy or pneumonia, which may have been the cause of death. These include a good number of operated-on cases. The cause of death in the operated-on cases as judged from this series has been either pleurisy or pneumonia rather than anything else. In addition to the complications causing death listed above, may be mentioned injury to the blood vessels. There have been two cases described in which the death has been attributed to hæmorrhage due to injury to a large branch of the portal vein during an operation for exploring and aspiration. In both cases the hæmorrhage took place into the peritoneal cavity, death taking place one hour after operation.

Association with intestinal lesions.—Though the series consists of 169 cases, the following observations are based on 108 cases only in which the notes were considered by us as very satisfactory.

(*i*) Acute generalized lesions all over the large bowel, from the ileo-cæcal valve to the rectum, the ileo-cæcal valve being free (in many cases the cæcum was free), 29.6 per cent.

(*ii*) Acute generalized lesions with perforation and perforative peritonitis (these have not been included in the above figure), 2.7 per cent.

(*iii*) Chronic generalized lesions, thickening of the wall, cicatrical contractions, puckering of mucosa (lesions not particularly localized to any particular part) (in these also the cæcum has been free in many cases), 20.3 per cent.

(*iv*) Colon alone the seat of lesions (acute), 16.6 per cent.

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(*v*) Cæcum alone involved (extending in depth into the deeper muscular coats, lesions acute), 9.2 per cent.

(*vi*) Appendix alone, 0.9 per cent.

(*vii*) Rectum alone, 1.8 per cent.

(*viii*) Cases in which the cæcum was involved in either an acute or chronic process [this includes cases in (*i*), (*ii*), (*iii*) and (*v*) above], 26.8 per cent.

(*ix*) No intestinal lesions, the large bowel being described as showing "no pathological condition," 18.9 per cent.

One case presents interesting features in that it was diagnosed as "acute appendix" and operated on for appendicitis. At the autopsy the liver was found to be the seat of an abscess 3 inches in diameter and the intestine free from ulceration. It may be that the appendix alone was affected. Unfortunately there are no details of the histology of the amputated appendix available.

From the facts described above it will be seen that in over 60 per cent. of the cases the intestinal lesions were acute. From these figures and our experience we are led to conclude that the hepatic complication can be better explained by the severity of the lesions than by the site of the lesions. The deeper the lesions, the greater is the involvement of the vessels, and the greater is the chance of thrombosis. The involvement of the muscular coats also favours dislodgment of the affected thrombi, and their being carried in the portal circulation to the liver. If the bowel wall is more extensively involved there result large sized perforations or massive sloughing of several inches of the bowel. We shall deal with this part of the subject later.

Predisposition.—It has not been possible for us to collect data which are likely to throw light on this subject. The few facts collected from the material at our disposal are as follows:—Marked alcoholism was recorded in five cases, syphilis in four, and drug addiction only in one. It need hardly be added that these are misleading findings and no notice can be taken of these.

Duration of the symptoms in hepatic amœbiasis.—This includes symptoms referable to intestinal lesions, as also the hepatic lesions complained of.

(*i*) Over one year	.. 0.8	per cent.
(*ii*) Over six months	.. 5.0	,,
(*iii*) Over four months	.. 6.6	,,
(*iv*) Over two months	.. 25.8	,,
(*v*) Over one month	.. 34.0	,,
(*vi*) Under one month	.. 17.5	,,
(*vii*) Under fifteen days	.. 10.0	,,

These figures have been based on 117 cases. The rest of the cases had been brought into the hospital in a dying condition and the death took place before any details could be obtained.

As regards the condition of the other organs of the body, we are not in a position to give a classified table sufficiently clear to throw any light on amœbiasis; and the same may be said of the condition of unaffected livers.

Consideration of these points we prefer to postpone to a future occasion.

We desire to express our indebtedness to the Professor of Pathology, Grant Medical College, Bombay, for his kind help and direction in the preparation of this paper.

THE RESULTS OF PROPHYLACTIC CHOLERA INOCULATION IN FARIDPUR DISTRICT.

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DURING the summer of 1930, a very severe epidemic of cholera broke out in several villages of the Faridpur district, accounting for a total of 3,445 cases amongst a population of only 256,249; of the latter, 52,295 were inoculated at the beginning of the epidemic with one cubic centimetre of cholera vaccine prepared in the Bengal Vaccine Laboratory with local strains. As in some instances a few cases occurred amongst the inoculated also, the whole question was carefully investigated to get an accurate idea of the extent of protection conferred by a single dose of cholera vaccine. The results of such an enquiry are set forth below.

The aggregate population of the affected villages is 256,249; of these the inoculated population of 52,295 furnished 171 cases, giving a case incidence of 3.3 per mille, while the uninoculated population of 203,956 gave 3,274 cases, showing a case incidence of 16.0 per mille. As the case incidence varied rather widely in the different areas, it is more satisfactory to take the actual affected units and compare the incidence of the disease in the inoculated and uninoculated populations.

(*a*) In Rajbari thana (population 7,067), 70 per cent. of the population was inoculated. Amongst the inoculated the case incidence was 2.8 per mille and, excluding cases which occurred within five days of inoculation, 1.4 per mille, whilst the case incidence amongst the uninoculated was 90 per mille. The actual figures are very significant. Amongst an inoculated population of 4,946, there were only 14 cases (of these 7 cases occurred within five days of inoculation), whilst among the rest of the uninoculated population, forming less than half of the inoculated population there were 208 cases, with 69 deaths; on the latter basis, the inoculated population should have furnished 485 cases, but actually only 14 occurred. The ratio of attacks among inoculated to attacks among uninoculated works out as 1 to 64.

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(*b*) In Char Bhadrasan (population 3,669), where 56 per cent. of the population was inoculated, no case at all occurred among the inoculated, while among the uninoculated (44 per cent.) the case incidence was 63 per mille or actually 102 cases with 45 deaths.

(*c*) In Nagarkanda (population 4,457), 53 per cent. of the population was inoculated. The case incidence amongst inoculated was 2.1 per mille and amongst the uninoculated was 43 per mille. The inoculated population of 2,361 furnished only 5 cases with 3 deaths, whilst the uninoculated population of 2,096 gave 91 cases with 72 deaths.

(*d*) In Madhukhali (population 1,945), 38 per cent. of the population was inoculated. No case at all occurred amongst the inoculated, whereas 24 cases occurred amongst the uninoculated, giving a case incidence of 20 per thousand.

(*e*) In Silchar (population 2,100), 37 per cent. of the population was inoculated. The case incidence among the inoculated was 16 per mille, and excluding cases which occurred within five days of inoculation was only 4 per mille, as against a case incidence of 47 per mille in the uninoculated.

(*f*) In Bhanga (population 17,023), where 34 per cent. of the population was inoculated, the case incidence amongst the inoculated was 0.3 per mille as against 49 per mille in the uninoculated. The actual figures are remarkably significant. Amongst the inoculated population of 5,889, there were only 2 cases with 1 death, whilst amongst the uninoculated population of nearly double (11,136) there were 546 cases with 207 deaths. The saving in life as a result of inoculation can hardly be expected to be better after only a single dose of vaccine is given.

(*g*) In Kotwali (population 10,438), where 24 per cent. were inoculated, the case incidence amongst the inoculated was 1.8 per mille as against 19 per mille amongst the uninoculated. The actual figures are significant. Amongst the inoculated population of 2,822, there were 5 cases with 1 death, whilst among the uninoculated population of 7,616 there were 152 cases with 94 deaths.

(*h*) In Baliakandi (population 8,834), where 24 per cent. of the population was inoculated, the case incidence was 0.4 per mille among the inoculated, but was 18 per mille among the uninoculated. The inoculated population of 2,136 furnished only one case, whereas the uninoculated population of nearly double (4,698) gave 82 cases.

(*i*) In Pangsa (population 34,470), where 23 per cent. were inoculated, the case incidence was 7.9 per mille amongst the inoculated, and excluding cases which occurred within five days of inoculation was 4.6 per mille, as against 31 per mille in the uninoculated.

(*j*) In Sadarpur (population 24,965), where 22 per cent. of the population was inoculated, the case incidence was 6.6 per mille amongst the inoculated and, excluding cases which occurred within five days of inoculation, 1.8 per mille as against 10.1 per mille in the uninoculated.

(*k*) In Gopalganj, where 22 per cent. of the population was inoculated, no case at all occurred amongst the inoculated, whereas the incidence was 18 per mille amongst the uninoculated.

(*l*) In Bhushna, where 19 per cent. of the population was inoculated, the case incidence was 1.2 per mille and 8 per mille amongst the inoculated and uninoculated, respectively.

(*m*) In Maksudpur, where 15 per cent. of the population was inoculated, no case at all occurred amongst the inoculated, but the incidence was 10.3 per mille amongst the uninoculated, or an actual figure of 135 cases.

(*n*) In Gossainhat, where only 13 per cent. were inoculated (population 33,395), the case incidence amongst inoculated was 1.8 per mille, and excluding cases which occurred within five days of inoculation was 0.9 per mille, as against 9.5 per mille in the uninoculated. The inoculated population of 4,359 gave 8 cases with 4 deaths and the uninoculated population of 29,036 gave 277 cases with 97 deaths.

(*o*) In Lonesingh and Matbarerchar (population 21,300 and 11,415), where only 11 per cent. were inoculated, the case incidence amongst the inoculated was 1.3 per mille and 6.8 per mille, respectively, whereas it was 3 and 15 per thousand, respectively, in the uninoculated.

(*p*) In Palong (population 29,193), where only 6 per cent. were inoculated, the case incidence among inoculated was 1.7 per mille and, excluding cases which occurred within five days of inoculation, was only 0.5 per thousand, whereas it was 3.7 per mille in the uninoculated.

The above results are far too striking to be accidental. In the rural areas the inoculated and uninoculated live side by side and cannot be said to differ in their conditions of living. As cholera attacks all classes of persons alike, one must conclude that the marked difference noted in the attack rate between the two classes of population is really the effect of the protection induced as a result of prophylactic inoculation.

Another striking point noticed is that the beneficial effect is more marked where the inoculated population forms a fairly high percentage of the total, at least not less than 35 per cent. In Nagarkanda, where over half the population was inoculated, 5 cases and 91 cases occurred in the inoculated and uninoculated, respectively. In Char Bhadrasar, where 56 per cent. of the population was inoculated, no case occurred among the inoculated, but in the uninoculated forming less than half the population, there were 102 cases. In Bhanga, where 34 per cent.

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were inoculated, the inoculated and uninoculated furnished 2 cases and 546 cases, respectively. In Rajbari, where 70 per cent. were inoculated, we have 14 cases in the inoculated, while the uninoculated, forming less than half the inoculated population, gave 208 cases. It is not quite clear why the beneficial result of inoculation is not quite so markedly shown when only a small percentage of the population is inoculated. It is probable that, when the disease is rampant in the uninoculated population, the dose of the infecting material is so high that it occasionally overcomes the protection conferred by the single inoculation. It is well known in animal immunisation experiments that an immunised animal can be made to succumb even though immunised by increasing the dose of the infective agent.

It is encouraging to note that, wherever prophylactic inoculation has been tried, the result has been invariably satisfactory to some extent or other. Not one instance has so far occurred where it could be said to have failed to confer any degree of protection. In some cases as in Char Bhadrasan, Rajbari, or Nagarkanda, the results obtained have been satisfactory beyond expectation. One could hardly have imagined that a single inoculation of vaccine could have conferred such a high degree of protection. In a small number of areas, however, the resulting protection does not appear to be so high. This may have been expected in localities where the epidemic was particularly virulent; but as a matter of fact it is exactly the reverse. It is actually in places where the epidemic was of a mild character that the inoculation appears to have conferred a less amount of protection. This suggests two possibilities, one is that a second dose of vaccine should be administered some time after the first. In a recent contribution to the *Indian Journal of Medical Research* on the "Development, Duration and Restoration of Immunity" Col. Harvey, I.M.S., and Major Iyengar, I.M.S., observe "A single dose of vaccine can produce immunity, but not of so high degree as two or three doses." The other is the possibility that the causative factor of clinical cholera may occasionally be other than the typical cholera vibrio. Tomb and Maitra have pointed out the fact that in sporadic cholera the causative organ is not the typical agglutinating vibrio. It is, therefore, possible that in some epidemics of clinically diagnosed cholera the causative organism is not the typical cholera vibrio. Vaccines made therefore from typical cholera vibrios could not be expected to confer in such cases the usual high degree of protection. This point could only be elucidated by further bacteriological research on the organism responsible for cholera epidemics in different places.

Another important point brought out in the course of this work is the fact that no negative phase exists after cholera inoculation. There has been a sneaking suspicion that such a negative phase may actually be present in cholera and that, therefore, in times of epidemics the inoculated stand in danger of being specially victimised. The results of the present enquiry completely refute such a possibility: 52,295 persons were inoculated at a time when cholera was widely prevalent, but among these only 64 cases occurred within five days of inoculation. If anything like a negative phase existed, we should have had a regular crop of cases within the first few days after inoculation. That only 64 cases should have occurred among 52,295 within five days of inoculation, whereas 3,274 cases occurred in the remaining 203,956 uninoculated population, is sufficient proof of the non-existence of a negative phase. On the other hand, there is distinct evidence that inoculation confers some benefit even within a day or two. This observation was actually made by some epidemic doctors nearly three years ago. In the present instance the case incidence among the inoculated within five days of inoculation was only 1.2 per mille, as against 16 per mille in the uninoculated. There is therefore reason to believe that some benefit results even within five days of inoculation.

ON THE ANALYSIS OF THE MORE COMMONLY USED OINTMENTS OF THE "BRITISH PHARMACOPŒIA" CONTAINING AN INORGANIC PRINCIPLE AS THE ACTIVE CONSTITUENT.

By EDWIN H. BUNCE, F.I.C.,

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IN studying the analysis of ointments of this type, it was found that not all of the methods previously described are entirely satisfactory. Thus in the determination of mercury volumetrically by the thiocyanate process the results tend to be low. Dissolving out the fatty bases with a suitable solvent such as ether may sometimes be accomplished, but the process is often tedious, and if an apparatus such as the Soxhlet is used it is difficult to prevent some of the non-fatty substance being carried over with the ether to a greater or less extent. The methods described below have been investigated and found to give reliable results.

Boric acid ointment.

The boric acid is determined by treating 1-2 grams of the ointment with petroleum ether in a beaker. The ether is decanted off through a filter, and the paper washed free from fatty matter with a little more ether. The filter is then washed through with boiling water into the original beaker, an equal volume of glycerine added, and the resultant solution titrated with N/10 NaOH to phenolphthalein.

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Lead subacetate ointment.

Five grams of the ointment are weighed in a beaker. The beaker is then warmed to melt the ointment, then about 30 c.cs. of ether added. When the fatty matter is dissolved, the contents of the beaker are poured into a separator, the beaker is washed out with 10 c.cs. of water and finally rinsed with ether, all washings being collected in the separator.

Dilute sulphuric acid is then added, and the mixture shaken. The acid aqueous layer is drawn off into the beaker. The process is repeated three times and each time the acid layer is drawn off. At this stage the ether remains clear and is free from lead.

Two volumes of alcohol are then added to the contents of the beaker. The liquid is well stirred, and after standing, filtered through a prepared Gooch crucible. The precipitated lead sulphate is then washed with alcohol, dried, ignited, and weighed.

Mercury ointment.

One gram of the sample is warmed with concentrated nitric acid to dissolve out the mercury. The mixture is washed with warm water into a separator, and the aqueous layer drawn off into a beaker. The fatty residue is then repeatedly extracted with warm water acidified with nitric acid. The washings may be filtered into the receiving beaker, although there is little tendency for any fatty matter to pass through if the operation is carried out carefully.

The combined filtrates are then made ammoniacal and sulphuretted hydrogen passed in the cold. The liquid is allowed to stand overnight, filtered through a prepared Gooch crucible, washed with water, then alcohol, and finally with carbon bisulphide. The Gooch and contents are dried to constant weight in the water oven. From the weight of HgS thus obtained the weight of mercury is calculated.

Ammoniated mercury ointment. (White Precipitate ointment).

For the determination of the ammoniated mercury present 5 grams of the sample are warmed with dilute hydrochloric acid.

The mixture is washed into a separator, and the acid aqueous layer drawn off into a beaker, the fatty matter is then repeatedly extracted with warm dilute hydrochloric acid. The liquids are filtered into the receiving beaker, although as in the case of mercury ointment there is little tendency for any fatty matter to pass through.

The collected washings are nearly neutralised, H_2S passed in the cold, and the precipitated HgS treated in precisely the same way as described under mercury ointment.

A fat solvent such as ether may also be used simultaneously with the acid extraction, but there appears to be no material advantage in so doing.

Yellow mercuric oxide ointment.

To determine the mercuric oxide present heat 5 grams of the ointment with hydrochloric acid; the mixture is washed into a separator with warm water and the acid layer run off into a beaker.

The fatty matter is repeatedly extracted with warm dilute hydrochloric acid, the collected washings nearly neutralised, H_2S passed and the determination completed as above.

Mercurous chloride ointment. (Calomel ointment).

Five grams of the ointment are treated with ether. The ether is decanted off through a small filter paper which is washed free from fat and dried. The residue of mercurous chloride contained in the beaker is washed into a stoppered bottle with 50 c.cs. of water.

The filter paper is then dropped into the bottle, 5 grams of potassium iodide added, then 50 c.cs. of N/10 iodine solution and the liquid well shaken.

When the mercurous chloride has completely dissolved, the excess iodine is titrated with N/10 thiosulphate solution.

1 c.c. N/10 iodine = 0.0236 gm. HgCl.

Zinc ointment.

The zinc oxide is determined by treating 2 grams of the ointment with petroleum ether. It may be warmed gently with advantage. The ether is poured into a separator and 10 c.cs. of dilute hydrochloric acid (equal vols. of water and concentrated hydrochloric acid) poured into the beaker. The interior of the beaker is thoroughly washed with the acid, which is then transferred to the separator. The beaker is now rinsed out with a little more ether into the separator, and the latter is well shaken.

The acid aqueous layer is run off, and the extraction of the petroleum ether repeated once more with dilute acid and finally with water.

The total acid aqueous extract is then just neutralised with caustic soda until a faint precipitate appears, and the requisite quantity of sodium carbonate added to precipitate the zinc present.

Finally the solution is brought to the boil, the precipitate filtered off, washed free from sodium carbonate, dried, ignited, and weighed as ZnO.

CORRIGENDUM.

In the article by Col. Clemesha and Dr. J. H. Moore in our issue for December 1930, p. 677, second column, in the paragraph headed "Stage 1," Col. Clemesha writes to say that the meaning has not been very clearly expressed. The patient is treated, either with alkalies and quinine, or with cinchona febrifuge tablets in the dosage given, until he is afebrile. When he becomes afebrile, he is given one tablet of Plasmoquine Co. each day for one week.

Col. Clemesha adds that he is now using the newly introduced Quino-Plasmine. This is stated to contain 0.3 gramme of quinine sulphate and 0.01 gramme of Plasmoquine,—a much more suitable combination than the former Plasmochin Co. tablet.—(ED., *I. M. G.*).

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A Mirror of Hospital Practice.

ENTEROCOCCUS INFECTION.

By G. SUBBARAYUDU, L.M.P.,
Assistant to the Second Physician, Government Royapuram Hospital, Madras.

AN interesting case of prolonged fever came under my close observation for a period of 6 months, which apparently manifested signs and symptoms of kala-azar for which treatment was adopted in the beginning to no effect. A series of methods of diagnosis and treatment were tried and ultimately an autovaccine prepared from the bowel wash relieved the patient. The case is as follows:—

The patient, Miss K., aged 24 years, was admitted in the wards of the 2nd Physician of Government Royapuram Hospital, Madras, on 18th June, 1928, with complaint of 7 days' fever which started with shivering at home.

Condition on admission.—Temperature 103°; moderately nourished; slightly anæmic; tongue coated; bowels not regular; spleen and liver enlarged, lower border being 4 fingers and 3 fingers, respectively, below the costal margin; circulatory and respiratory systems, nothing abnormal was seen. She gave a history that about a month previously she had been admitted into the hospital "for chronic malaria," and was then laid up for 15 days at the end of which period she took her discharge. The usual routine examinations necessary for a continuous fever were done and she was kept on a "diaphoretic" mixture with hexamine, and on fractional doses of calomel and salol. Temperature, etc., were charted 4-hourly from the commencement. No malarial parasite was found in the blood-smear, but signs of a slight degree of secondary anæmia were found; no leucocytosis, but slight leucopenia present. The blood was tested for Widal's reaction with negative result:—

Bacillus typhosus,	negative 1 in 25.
" *paratyphosus,* A. B. & C.,	positive 1 in 25 and negative 1 in 50.

Urine-diazo reaction, weakly positive.

On the 5th day after admission the temperature came down to normal but again rose up fluctuating between 99° and 102°. Inspection of the 4-hourly chart showed that there was a double rise of temperature in 24 hours, and she was given Stiburea intravenously with no improvement. The temperature continued to range between 99° and 101° or 102°, once in a way coming down to normal and again shooting up. The double rise in the day was also keeping on, almost constantly. A blood-smear was again taken and examined for malarial parasites on 4th July, 1928, with negative result. All the same, she was given acid quinine hydrochloride intravenously. After this, the temperature kept normal at intervals for longer periods than before though now and again it shot up. Continuous oral and periodical intravenous administration of quinine were combined, and appeared to give relief. But again after a few days the temperature became high, this time beyond 103°, and the double rise was again noticed. Liver puncture was done and the smears were examined for kala-azar bodies, with negative result. However, intravenous administration of Stiburea was again started and a regular course of bi-weekly injections was given, with no improvement. Oral administration of quinine was continued. No improvement appeared.

With a view to completing all possible pathological examinations a catheter specimen of the urine was sent to the King Institute, Guindy, for the first time in the early part of July and again in the last week of August. The report said on both the occasions, "urine cultures sterile." The blood was examined for "gel test" with "negative result even after 24 hours." It was also sent to the King Institute, Guindy, for "culture for kala-azar bodies"; and the result was reported as "no flagellates seen in cultures." The result of a distilled water enema received into a sterilized bed pan was sent to the King Institute for culture of the motion on 21st September, 1928. The report was received to say that "no specific organisms could be isolated by the ordinary cultural method" and that "a different method of cultivating on pathogenic selective medium might be used with advantage."

Though the patient was bed-ridden, she maintained a satisfactory general condition and her lungs were quite clear throughout.

Before the report of the King Institute about the culture of the distilled water enema was received from Guindy, one day towards the end of September, in the forenoon the patient got a very severe rigor with a rise of temperature above 104°. A blood-smear was taken and examined again. Now malignant tertian rings were found, and it looked as though the whole problem were solved. Intravenous administration of quinine alone on alternate days was persisted in; and the temperature was kept under control for a few days. But it again shot up and again showed even the double rise occasionally. So the Stiburea was also repeated in spite of the fact that it had previously failed and that blood-culture was negative; but it had no effect as before.

Next it was decided to take advantage of the special method of culturing the motion suggested by the King Institute, as a last resource. Though in fact the patient had never had any loose motions, the result of the distilled water enema received into a sterilized bed pan was inoculated into a specimen of the patient's own blood taken from her vein, and a culture was made by the King Institute. They isolated an organism, "Enterococcus" and 6 tubes of autovaccine were supplied by the Institute, in strengths of 20 millions (2 tubes), 50 millions (2 tubes), and 100 millions (2 tubes). These were injected, starting with 10 millions, in increasing doses once in 5 days, commencing on 6th November, 1920. The second injection (20 millions) was given on 11th November, 1928, and from 13th November, 1928, onwards for 4 days she was completely normal on the 4-hourly chart. On the 17th the temperature shot up to 101° at 12 noon and came down to 99° by 4 p.m., and, peculiarly, went up to 101° by 8 p.m showing that the "double-rise" character had not left. But, however, no Stiburea was resorted to again and with the third injection onwards the temperature gradually came down to normal and kept below 99°. Before the end of the month it went up to 100° on 3 or 4 occasions only, showing also the double rise for once, i.e., on 28th of November. From the 30th of November till the time of discharge from hospital on 18th December, 1928, the temperature never rose at all.

The full course of autovaccine was given and it was contemplated to get higher strengths and give a 2nd course, but the patient asked for her discharge and went away. On the day of discharging her, the blood-smear was again examined for malarial parasites with a negative result, but signs of anæmia still persisted and mononucleosis was also present. By this time the reduction in the size of spleen and liver was only by one finger-breadth in the case of each organ. Quinine was continued orally till the end.

The point of interest in this case is that there were no symptoms of irritability to indicate a source of infection in the intestines. It was only the prolonged and undulating and never-yielding fever that could suggest it as one of the possible sources of infection. One

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diagnosis is certain, that she did have malignant tertian malaria as the microscope showed it, and as equally is it certain that the enterococcus infection did exist, since the culture—and more the results of autovaccine treatment—proved. The question of kala-azar still remains undecided. The characteristic double rise of temperature has always been suggestive, and the leucopenia and the mononucleosis might plead for it, but yet the Stiburea did not produce any effect. And more, the laboratory examinations gave negative results, both the smear of the liver puncture and the culture of the blood too. Even the "gel test" was negative. It might be said perhaps that a smear of the splenic puncture could have been examined for kala-azar bodies, but is not the liver puncture of equal significance?*

Might I venture to point out that cases coming in with enlarged spleen and liver even in an endemic locality like Madras should still have to be confirmed by actual bacteriological examination or positive microscopic examination before being denominated "kala-azar" and being treated as such and such alone? I hope that the observations made and the results of treatment adopted in the case quoted, are aid enough to my presumption. And I also believe that this report of the case will throw some light on the significance of cultural examinations to be resorted to as routine practice wherever facilities exist.

My thanks are due to the authorities of the Government Royapuram Hospital, Madras, for having permitted me to publish this case and to Dr. V. C. Govinda Menon, L.R.C.P. & S., the then Second Physician, Government Royapuram Hospital, for having kindly gone through this paper.

A CASE OF ACUTE GLOSSITIS.

By G. NARAYANASWAMY MUDALIAR, L.M. & S.,
Triplicane, Madras.

I WAS called in to see a Hindu lady, aged about 50 years, on the night of the 17th of October, with a complaint that the tongue was swollen and protruding outside the mouth. When I examined her, the tongue was seen to be enormously swollen and painful. The patient could not close her mouth as the swollen tongue was pushed out to about half its length. The throat could not be seen and there was a gurgling noise due to difficulty in clearing the throat. The submaxillary glands were also swollen. She had a temperature of 101 degrees, and the pulse rate was 120 per minute. There was severe pyorrhœa alveolaris and the lower central incisors were loose. There was also salivation. A history of pyrexia for nearly 16 days with the temperature coming on every other day was given. She was under native treatment all the while. She developed the swelling of the tongue about 4 days before in a mild form; this subsided a little but again assumed a severe form on the day I saw her.

I gave her an injection of 0.5 c.cms. of adrenalin and prescribed a mixture containing calcium chloride with tincture of belladonna, and also ordered a hot antiseptic gargle. I ordered 3 ounces of mixtura alba to be given the next morning. Hot Antiphlogistine was applied to the swollen submaxillary glands on either side below the jaw.

When I saw her the next morning to my great surprise I found that the swelling of the tongue was reduced considerably, the protrusion having disappeared.

As there was a history of fever coming on every other day I gave her quinine injections, 5 grains, followed by 20 c.cms. of antistreptococcal serum in the evening, and also asked her to continue the same mixture.

She was brought to my office two days after with the information that there was no recurrence of the swelling of the tongue. She appeared to be quite all right except for the dirty teeth. I extracted the loose teeth and gave her instructions regarding oral hygiene.

Recollecting the editorial note in the September issue of the *Indian Medical Gazette* of 1926, that such a condition might be giant urticaria, it struck me that I might try an adrenaline injection followed by calcium by the mouth. The treatment had the desired effect, the tense swelling of the tongue and the prolapse having disappeared the very next morning. There was a possibility of a streptococcal infection from the dirty teeth, as suspected in a similar case reported in the January issue of the *Gazette* of 1927, also being a causative factor.

The absence of sudden onset is against giant urticaria, but anyhow the result of the treatment indicates an allergic condition.

*In our opinion, not quite. Parasites are nearly always present in larger numbers in the spleen than in the liver; therefore in cases in which there is a scanty infection they are liable to be overlooked in a smear from the latter.—EDITOR, *I. M. G.*

A CASE OF PATENT DUCTUS ARTERIOSUS WITH INFECTIVE ENDOCARDITIS.

By R. VISWANATHAN, B.A., M.B., B.S.,
Assistant Professor of Medicine, General Hospital, Madras.

THE following case is interesting in that the patient had exhibited no symptoms for 16 years in spite of possessing a congenital heart lesion and that he was subsequently afflicted with a superimposed infective endocarditis with atypical subjective symptoms.

R., aged 16 years, was admitted on 24th March, 1930, as an in-patient in the First Physician's wards of the General Hospital, Madras, complaining of œdema of the whole body and passing scanty urine for one month previously. He was perfectly all right before this attack, which began with swelling of the face, the swelling extending to other parts of the body afterwards. He did not complain of fever or of breathlessness.

On admission the patient had a mild degree of general anasarca, a certain amount of cyanosis and a tendency to clubbing of the fingers. There was diffuse pulsation over the precardium, specially marked in the second left intercostal space an inch and a half from the middle line. There was a distinct thrill, occupying almost the whole of the cardiac cycle, in the same space. On auscultation there was a continuous hum in the pulmonary area and to the left of it, heard both during systole and diastole. The systolic portion of the hum was very loud and harsh. Besides there was a diastolic and a small systolic murmur in the aortic area. The pulse was distinctly waterhammer in character, the pulse pressure being more than 80.

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The following investigations were also made:

Urine.—Alkaline, specific gravity 1015, no sugar, albumen or deposits.

Blood Picture.—Slight polymorphonuclear leucocytosis.

Blood culture.—Sterile. Hæmoglobin 44 per cent., red blood cells 2,070,000 per c.mm., white blood cells 10,310.

Blood urea.—0.34.

Urea concentration:—

1. Before giving urea—quantity 88 c.c., urea 0.95 per cent.

2. One hour after giving urea—50 c.c., 1.26 per cent.

3. Two hours after giving urea—62 c.c., 1.48 per cent.

Blood cholesterol	.. 135 mgm.	
Blood chloride	.. 580 mgm.	
Blood phosphate	.. 3.6 mgm.	
	Systolic.	Diastolic.
Blood pressure	.. 110	30

X-ray heart—General enlargement with marked bulging of the left auricle.

While in the hospital he was running an irregular temperature sometimes going up to 102°F. in the evenings. It was peculiar that the patient had no subjective symptoms excepting for a slight breathlessness on exertion until the evening of 6th April, 1930, when he suddenly became unconscious, worked into convulsions and rolled out of bed. The pulse became rapid and feeble. He remained in that state till the next morning when he died.

A partial post-mortem was done by Dr. Narayana Pai of the Department of Pathology, Medical College, Madras, report of which is given below:—

Report.

Heart weighs about 14 ounces, is enlarged, especially the left side. The endocardium of the right auricle is thickened and opaque and its cavity is slightly enlarged. The tricuspid valve is apparently normal.

The right ventricle is markedly dilated and its wall slightly thickened. The columnæ carneæ are well seen. The segments of the pulmonary valves are thickened and show irregular opaque, yellowish-white, firm, warty excrescences on their ventricular surface. The pulmonary artery is larger than normal, in fact, larger than the aorta in the specimen. Commencing from immediately above the anterior cusp of the pulmonary valve is seen a tract of vegetations similar to those seen on the segments, half an inch broad, running upwards to a distance of about two inches, terminating in a warty mass of the size of a tamarind seed.

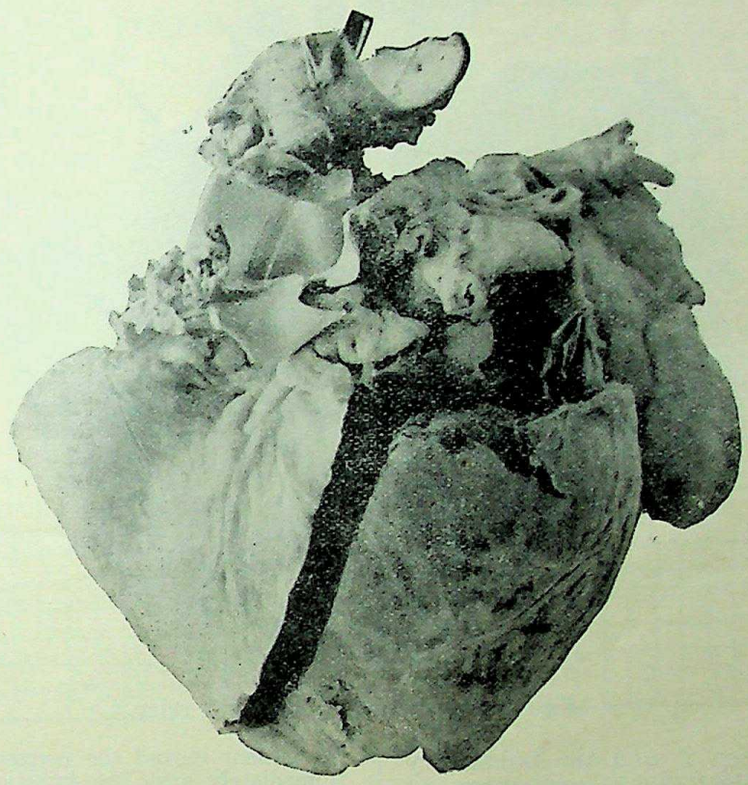

Fig. 1.—Rod through patent ductus arteriosus.

About two inches from its commencement anteriorly, the pulmonary artery is adherent to the aorta at the level of the summit of the arch and communicates with it by a narrow passage (through which a blue glass rod is passed in the accompanying illustration). The pulmonary end of this passage is surrounded by small vegetations. The aortic end of this

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passage is found in the floor of a funnel-shaped depression encircled by a ring of atheroma.

The left auricle.—The endocardium is thick and opaque. The mitral valve is normal.

The left ventricle is dilated and its wall is very much hypertrophied with prominent columnæ carneæ and papillary muscles. The cusps of the aortic valve are thickened and their ventricular surface covered with small irregular vegetations similar to those described above. *The aorta* shows well-marked atheroma at its commencement and higher up is seen the communication between it and the pulmonary artery, already described, which is the remnant of the ductus arteriosus.

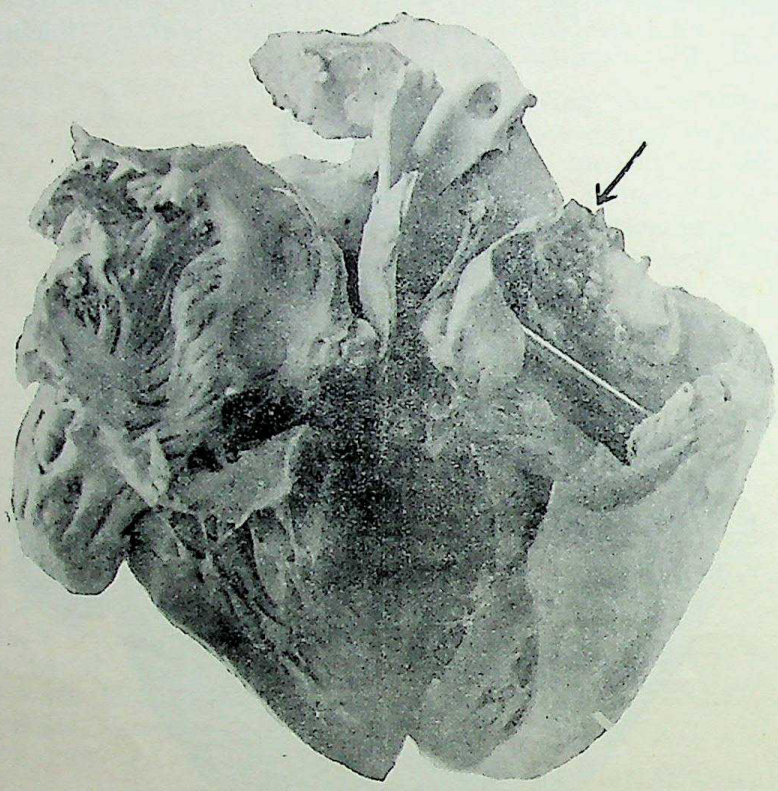

Fig. 2.—Vegetations, pulmonary valve

Bacteriological examination of the material from the vegetations on the valves.—"The culture gives a growth of *B. coli*, evidently a contamination."

My thanks are due to Col. Malcomson for kindly allowing me to publish the case.

AN INTERESTING CASE OF ROUND-WORM INFECTION.

By L. KAMAL SINGH, L.M.P.,
State Doctor In-Charge, Tamenlong Dispensary, Manipur State.

I WAS called to see a Kuki female child aged 5 in my compound at 10 p.m. on 9th May, 1930. I found her on the lap of her mother in a state of deep unconsciousness. Her mother was trying to rouse her, frequently calling her by name.

On examination I found the following conditions:—All her limbs were flaccid, no enlargement of liver and spleen; both eyes were half opened, eyeballs rolled upwards and fixed, transparency of the conjunctiva seemed to be lost, pupils dilated and equal in size; mouth partially opened and fixed, no froth, lips pale; pulse quick and feeble. In no way could she be roused. The child seemed to be on the point of death. She had passed about 1 oz. of semi-liquid stool unconsciously.

I saw the same child in the evening, about 4 hours earlier, playing with her companions. There was no history of previous illness. She had had her meal about one hour before. She took a little treacle also before her meal, and her elder and younger sisters also partook of the same.

I administered half a dose of combined "Tabloid" of digitalin and strychnine sulphate gr. 1/100 each, hypodermically. On piercing the skin with the needle the patient moved the corresponding hand and cried. Immediately after the injection the patient vomited; this consisted of undigested boiled rice and vegetable rye which she had taken. Again she passed a small quantity of semi-liquid stool unconsciously. Brandy one drachm by the mouth was administered, and hot water bags to the feet and warm blankets were applied The patient was placed in bed.

About 20 minutes after these measures being taken, the half-opened eyes slowly closed, and the eyeballs, which were rolled up, slowly came down to the normal position; but other conditions remained the same.

At 12 p.m. the injection was repeated and brandy and other measures continued. About half an hour later, slow movements of the limbs were noticed, but there was no response to shouting. The patient was left in charge of the compounder.

Next morning at 5 a.m. I saw the patient at the side of the mother on the bed and called her by name; she responded. I asked the compounder what he had noticed. He said she was roused at intervals, but never responded, though movements of the limbs and groaning at intervals were noted.

At 8 a.m. again I saw the patient; to my surprise she was sitting and playing with an insect. I thought it possible the condition might be due to round-worm infection.

At 8 a.m. castor oil ½ oz. was given and she had good purging at 11 a.m. One dose of santonin and calomel was administered: at that time she could walk and talk,

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though she felt weak. She passed 5 fully matured round-worms at night and next morning she was found running and playing. The patient was afebrile throughout.

The symptoms appear to have been entirely due to round-worm infection.

In cases of unconsciousness, with the history of any previous illness, poisoning, injury, or any other such conditions, the possibility of round-worm infection, especially among children, should not be overlooked.

In the present case, it seems that the severe depressant action of the toxin was combated by the heroic doses of stimulants, and cure was effected when the worms were expelled.

MODIFIED ENTERICA FOLLOWING INOCULATION.

By JAMAL-UD-DIN,
MAJOR, I.M.S.,
Civil Surgeon, Ferozepore.

A MODIFIED case of the enteric group of fevers is not infrequently met with in practice. Several features exhibited by the case noted below are, however, considered almost unique and hence deserving of report:—

Mr. R., aged 35 years, had his first dose of T. A. B. vaccine on 25th September. The second dose of vaccine was given 10 days later. Previously he had maintained good health. On 10th of October he had a sharp rise of temperature to 104.6°F. with rigors; this dropped to 100° about 4 hours later.

On examination the patient complained of a constricted feeling in the chest and slight tenderness in the right hypochondrium; the abdomen was found to be very tympanitic. The spleen was not enlarged. No other positive sign was noticed until about the 7th day of the disease when the resonance of the right base of the lung was found to be impaired and several adventitious sounds were heard in this area. On the 9th day the right middle lobe was also found to be affected similarly, and the patient's condition was pronounced to be very serious. The lungs cleared up about 4 days later and the temperature dropped down to normal and continued so for 4 days. From now onwards the patient began to run a course of intermittent temperature varying between 102° and 98° for nearly 20 days, when once again his temperature settled down to normal. No signs of any importance were detected during this period of 20 days. In fact the patient was most cheerful, clamouring for extra food and was disappointed to learn that this had been withheld because of the rise of temperature, which usually occurred in the evenings.

The blood smear was examined on the first day of the disease and no malaria parasites were found.

The sputum was examined on several occasions for tubercle bacilli and was always found negative.

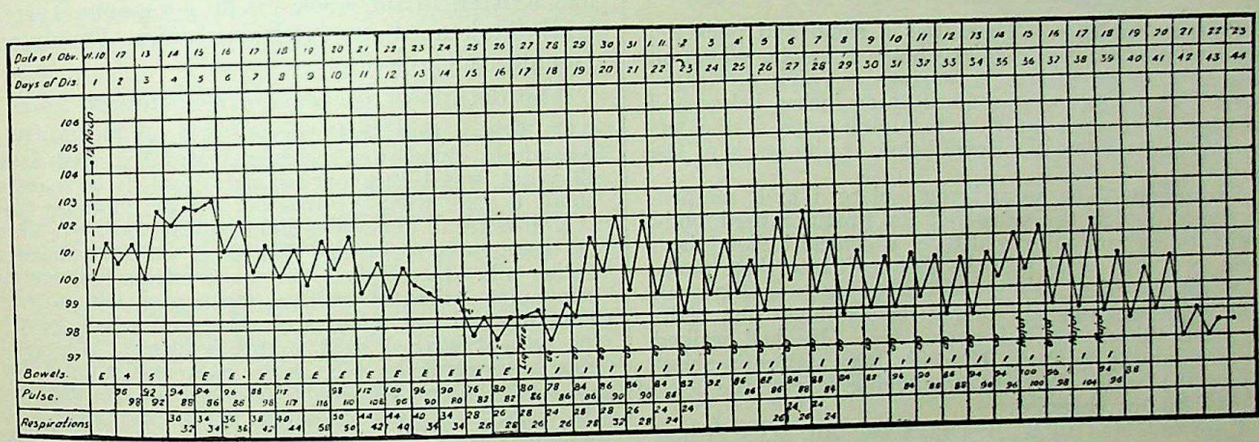
The patient was treated symptomatically for most of the time, except that a chlorine mixture and other intestinal antiseptics were freely resorted to and expectorants were given at the time lung was involved.

The Widal reaction was done once only on the 27th day of the disease and the laboratory report is reproduced below:—

	1—20	1—40	1—80
B. typhosus ..	+	+	±
B. paratyphosus A ..	+	+	+
B. paratyphosus B ..	+	+	±
B. melitensis ..	—	—	—
B. coli (strains 1, 3, 6) ..	+	+	+
B. coli (strain 8) ..	+	—	—

The fact that there was a sharp rise of temperature to 104.6° with rigors is significant. The first, second and the third weeks of the enteric course each represented by three days on the chart can easily be made out. The intermittent rise in temperature for 20 days would immediately suggest paratyphoid A even if the Widal was not done. The fact, however, that the patient's wife had but 4 days previously begun to run a normal temperature after having been laid up with a remittent type of fever lasting nearly 3 weeks was at once more significant and helpful in forming an opinion of the malady from the very beginning. Most significant of all, however, was the fact that the family blamed the inoculation for the onset of the disease and it took a certain amount of convincing that inoculation with T. A. B. vaccine a week earlier might have given the patient some immunity and, as it is, turned the tables in his favour.

The patient's temperature chart is reproduced.



A CASE OF BULLET WOUND.

By HABIB AHMAD KHAN LODI, B.SC., M.B., B.S., D.P.H.,
Bahawalpur.

U. K., Mohammedan, male, age 45, a Pathan resident of Khurasan, was admitted into Bahawal Victoria Hospital on 17th December, 1930, for a discharging

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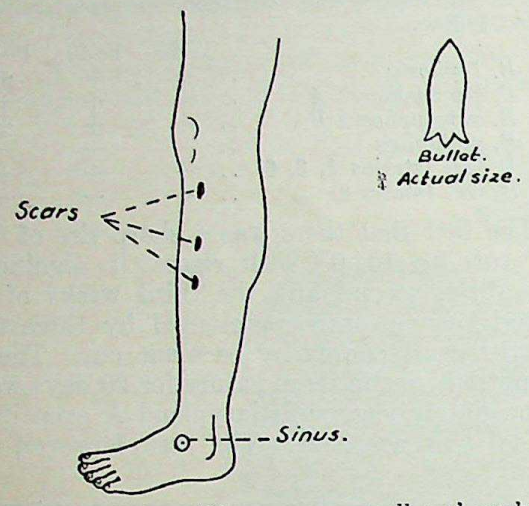
sinus on the outer malleolus of the left leg; duration of illness—eight months.

Eight months back when he was in Khurasan he sustained a bullet wound while sitting with his left leg flat on the ground and flexed. The bullet entered below the left knee and travelling along the inner aspect of the leg remained in it. He had great swelling below the knee, and discharge of pus and small pieces of bone from the wound of entry. The track of the bullet also gave way at two places and discharged a thin fluid.



Present condition.—There was a small and puckered ulcer on the lower part of the outer malleolus which on firm probing proved to be a sinus reaching up to the bone. There was a scar mark three inches below and quarter of an inch inner to the lower edge of the left patella and two smaller scars below in the track of the bullet.

Treatment.—The wound was enlarged and scraped. A finger put in the sinus felt an irregular hard body which on extraction proved to be a conical bullet ½ inch long by ¾ inch broad with its base split into three parts.

Remarks.—The case is worthy of note as the man had been carrying the bullet in his body for eight months without much inconvenience. He had walked from Khurasan to Darya Khan Railway station in about a month; whilst here he was going about the city selling his merchandise.

I am indebted to K. B. Dr. Dewan Ali, M.B.E., Chief Medical Officer, Bahawalpur State, for his kind permission to publish this case.

(The accompanying diagram will make the description clear.)

A CASE OF ECHIS BITE.

By K. G. GHARPUREY,
LIEUTENANT-COLONEL, I.M.S.,
Civil Surgeon, Ahmednagar (Bombay Presidency).

THE antivenene manufactured at Kasauli is only specific for cobra and daboia venom. However, I do not know whether the question of non-specificity of antivenene to allied poisons has been thoroughly worked out in India. In a report on the results of Australian research workers on Australian snake venoms, it is stated in the *British Medical Journal* of 1st November, 1930, on page 744 that "In the experimental production of passive immunity to snake venoms it has been found that monovalent antivenenes are strictly specific, except with the venoms of species closely allied to those used in the preparation of the antivenenes, though even here the degree of non-specificity is very slight. Close species relationship between the reptile supplying the venom for immunisation and the reptile whose venom is used for testing seems to be more important in determining non-specific protection than close similarity of the venoms in their toxic behaviour."

The notes on the case reported below were referred to the Rev. Father Caius who works on snake poisons at the Haffkine Institute, Parel, Bombay, and he says that:—

(*i*) The mortality from Echis venom is practically *nil*.

(*ii*) The mortality from Echis bites is much lower than 20 per cent. and is generally due to other causes than poisoning-shock, low vitality, etc.

(*iii*) Local signs in severe cases tend to disappear within 48 hours from the time of biting.

(*iv*) Sloughing and gangrene are comparatively rare occurrences.

(*v*) Antivenene injected 33 hours after the bite cannot have any specific action.

Most of this is contrary to what Col. Wall has written in his book "The poisonous Terrestrial Snakes of our British Indian Dominions (including Ceylon)."

The details of the case are as follows:—

On Friday the 22nd August, 1930, at Dhulia, West Khandesh, Bombay Presidency, Mr. R., aged about 40 years, was bitten on his right foot by a snake at about 6 a.m., when he was out for his morning walk, at a distance of about one mile outside the town, where the country is rocky and barren at the foot-ranges of Laling hill. He swished the snake off his foot and his companion killed it with a stone and left it there. The bite did not cause any acute immediate pain as the patient walked back to his residence. About one hour afterwards he felt some pain and noticed that his foot had swollen, and that there was oozing from the punctures. The swelling began increasing. The patient was anxious and sent for various herbalists, snake curers, etc. Their treatment had no effect and at last his medical attendant (Dr. Kirtane, M.B., B.S.), was sent for; the wounds were incised deeply, washed and potash permanganate rubbed in. This was done some hours after the bite was inflicted.

I happened to be in the town on casual leave and, as it was known that I was interested in the study of snakes, I was informed about the incident next morning. The history suggested that the bite was from a poisonous snake. At about 11-30 a.m., after seeing that antivenene was stocked at the Civil Hospital I went along with the Civil Surgeon, Dr. Sathe, and saw the patient. He was bed-ridden and his foot and leg had swollen tremendously, and the leg was blue-black in colour, the swelling extending to the knee. The appearance of the whole leg was like that of a bad big bruise. He did not complain of great pain but felt very thirsty.

The appearance indicated a viperine bite. Dr. Sathe and myself went along with the patient's companion who had killed the snake, to the spot where the snake was thrown. Fortunately the snake was still lying there and it was seen to be a phoorsa (*Echis carinata*) about 15 inches long. The snake has been kept in the Civil Hospital, Dhulia. The patient was advised antivenene injection and Dr. Kirtane injected subcutaneously 40 c.cms. of it in the afternoon. He was also put on calcium chloride in a mixture. Next day when his doctor met me, he said that the swelling was very much less, and since then the patient made an uninterrupted and complete recovery after a few weeks.

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The question arises if the antivenene which was injected 33 hours after the bite had any specific action. From the sudden change for the better in the condition of the leg within 18 hours of the injection, it certainly appeared to have. The antivenene issued is prepared from the venom of cobras and Russell's vipers. The poisons of all vipers are similar, if not the same, as judged from the symptoms and signs produced. The effects of poisoning by Daboia and Echis are more or less identical. Reasoning from this I recommended the antivenene injection and, according to the doctor in attendance, the result on the local swelling was very striking. The patient considers that his life has been saved by the injection.

Col. Wall in his book records a case on page 121 where a European male died of Echis poisoning, though antivenene was injected subcutaneously within a few hours of the bite. He remarks "One could not expect beneficial results from antivenene in this case, which was a wholly unsuitable one for the exhibition of this remedy. The serum prepared at Kasauli is only antitoxic to the venoms of the cobra and the Daboia." Though Dr. Calmette considered that his antivenene prepared mainly from cobra venom is curative against the poisons of many species of snakes (venoms, venomous animals, etc., published in 1908), Major Lamb refuted this by direct experiments on animals. It is considered that the antitoxin specificity lies in having a specific action on the poison of one species only and not even on the poison of an allied species.

In this particular case, weighing probabilities, it is likely that this patient would have survived without the antivenene as he had put himself in the hands of a well qualified medical practitioner. The mortality from Echis bites ordinarily is 20 per cent. and the patient would have recovered, but the intensity of the local signs seemed to indicate that the limb would have given a lot of trouble and probably some parts would have sloughed. This certainly seems to have been stopped by the antivenene.

A CASE OF PERNICIOUS ANÆMIA OF PREGNANCY.

By LIEUT. R. N. BANERJI, B.SC., M.B., B.S.,
Allahabad.

I AM describing the following case in detail to illustrate the remarkable recovery with raw liver treatment, although in every way the patient was not a textbook picture of pernicious anæmia. Pernicious anæmia of pregnancy is not a very rare condition and, if looked for, is often noticed in varying degrees in many multiparæ. If untreated, it is a progressive disease getting sharply aggravated during each pregnancy and after confinement.

On the 30th of May 1929, I was called in to see Mrs. J., aged 27, a Mohammedan lady of high family, and found her in a bad condition, temperature 102°, pulse 140 per minute, dyspnœa, hæmic murmurs, very marked anæmia, œdema of the feet and body; her general condition was low with a weak low tension pulse.

Previous history.—Mother of 5 children; last confinement on 4th May, 1929. There was no history of venereal disease in her or her husband or in the family, of tuberculosis nor of any other serious illness. She suffered twice from malaria; this was effectively treated, the fever lasting only a few days. During her first pregnancy she was subject to hysterical attacks but after delivery she never got hysteria. She was habitually constipated. Two years ago she developed slight pyorrhœa, but her teeth were attended to and the pyorrhœa disappeared. In the influenza epidemic of 1918, she suffered from influenza and pneumonia, but recovered completely. In March 1925, after delivery, she became very anæmic and also lost her appetite and general health, but she was restored almost to her former condition with suitable treatment. However, slight anæmia and decrease of appetite became a constant feature and never left her completely after that.

History of present illness.—In November 1928, she became pregnant and this was accompanied by further decrease in appetite and paleness of complexion. In April 1929, the condition became rather serious; the anæmia increased and was well marked, the appetite was completely lost and she developed ulcers in the mouth and on the tongue. On the 4th of May she was safely delivered, labour being normal, but the anæmia and general weakness increased. On the third day after delivery she got a slight rise of temperature (100.2°) which never became normal until liver treatment was started in June 1929. At the same time œdema of the feet and legs appeared, followed by œdema of the whole body. The anæmia became extreme. Hæmic murmurs were audible all over the heart area. The liver and spleen both became enlarged and even air hunger was observed occasionally. The respiration rate increased and the pulse became weak and running. Her temperature ranged between 100° and 102.8°F. Ulcers in the mouth and tongue, loss of appetite, and constipation followed occasionally by diarrhœa, became marked symptoms.

Laboratory examinations.—No amœbæ, ova, etc., were found in the stools, and no parasites in the blood. Von Pirquet's test was negative. The blood count showed less than 2 million red blood corpuscles and 20 per cent. hæmoglobin. The Widal test for the typhoid group was repeatedly negative. The Wassermann reaction was negative.

Past treatment. (Therapeutic tests.)—Quinine 20 grains daily for 7 days had not the least effect, nor had three injections of emetine of 1 grain each. When I took up the case, I found that the patient was having the following treatment:—

1. Ice bag on the head and cold sponge every four hours.
2. Strychnine and digitalin with adrenalin chloride twice daily.
3. Arsenic and iron in mixture form.
4. Extract of liver (liquid) twice a day in teaspoon doses.

I started the following treatment from the 31st May, 1929:—

(1) Eight ounces of mashed up fresh liver with lemon and some spices to flavour it, made into a semi-solid consistency and drunk through a feeding cup.

(2) Dilute hydrochloric acid, drachms three daily in one teaspoonful doses before meals.

(3) Two tubes of dry liver extract, 100 c.c. each every day in addition.

The patient was also encouraged to eat liver and kidney slightly cooked. All other drugs were stopped. Improvement followed from the first day; the heart became steadier; the patient was more comfortable and slept better. The enlargement of the liver and spleen disappeared in 7 days and afterwards these were not palpable. On the tenth day the temperature, which was gradually coming down, dropped to normal and has continued to be normal since. By the end of the month the patient had completely recovered and was moving

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about like a normal person. Her stomatitis got well within ten days. The patient is keeping quite fit; to-day she takes periodically liver and dilute hydrochloric acid and very often cooked liver and kidneys.

A CASE OF APPENDICULAR ABSCESS.

By S. R. GORE, L.M. & S.,

Honorary Surgeon, The Hubli Co-Operative Hospital Society, Hubli.

D. S., FEMALE, aged 8 years, was admitted into the Hubli Co-operative Hospital on 23rd November, 1930, in the evening.

Condition on admission.—Temperature—100, pulse—100, the volume of the pulse being very small. The abdomen was distended, board-like and tender all over. Look—anxious.

History.—Pain in the abdomen started a week previously and had continued since. There was vomiting in the beginning. No definite history was available about the locality where pain first started.

The patient was kept under observation; a soap and water enema was administered; some flatus and fæcal matter were removed by the enema. Glucose and sodium bicarbonate were administered by mouth. The pain continued and the bowels were kept open by glycerine *per rectum* every day. Antiphlogistine was applied over the abdomen. The temperature ranged between 98° and 99° until the 26th of November, but showed a tendency to rise on the 26th evening when it went up to 100°. Tenderness was by now localised to the right iliac region which was hard, but the general tenderness was lessened.

Examination of the blood.—On November 26th the absolute white count was 15,625 with 86 per cent. polymorphonuclears.

The antiphlogistine was continued, but the temperature rose to 100° again and the pulse began to get fast and reached 120 per minute on the 30th November. Fluctuation could now be felt in the right iliac region.

It was then decided to open and drain the abscess.

On the 1st December, an opening was made by McBurney's incision and about 5 to 6 ounces of pus was removed. A drainage tube was inserted and the wound was dressed as usual. In the evening the pulse fell to 90 and the temperature also came down to 97.5°. She was progressing fairly well though the bowels had to be opened with the aid of glycerine and there was occasional distention. On the 3rd December she began to complain of pain recurring often. On the 4th the pulse rose to 110 per minute. The flatus tube was passed and some relief was obtained, but the recurring pain continued, and the pulse rate began to increase. Distended coils could be seen from the outside. A glycerine enema had to be given twice a day. The temperature again showed a tendency to rise. Obviously there was some obstruction at the site of the abscess and, as the patient's condition was getting low, it was decided to open the general peritoneal cavity outside the abscess, ascertain the cause of the obstruction and to remove it, if possible.

On the 7th of December, in the evening the abdomen was opened in the middle line after carefully covering the abscess opening by fixing some gauze over the dressings by sutures to the skin. After opening the abdomen, we found some adhesions between the coils of the small intestine. The bands of adhesions were cut. The abscess cavity was left untouched but it could be plainly observed that the portion of the ileum proximal to the portion involved in the abscess cavity was distended. The ascending colon above the abscess cavity and the transverse colon were quite empty, and even mild pressure would not cause the distension in the ileum to be reduced. Short-circuiting was decided upon and the distened coil of the ileum was joined to the transverse colon and the abdomen was closed as usual and without drainage.

The flatus tube had to be continued for 2 days. After that, the general condition began to improve gradually. On the 10th December, the pulse fell to 90 per minute; the temperature was normal. The patient has made an uninterrupted recovery. The recurring pain stopped after the ileo-colostomy. Perhaps without the short-circuiting the case would not have recovered.

The second operation showed quite clearly that there had been a general peritonitis and that the abscess had developed later on and was localised.

The expectant line of treatment adopted in the beginning was after all correct.

NECROSIS OF THE MANDIBLE FOLLOWING ONE OF THE EXANTHEMATA.

By B. L. SAHI,

LIEUTENANT, A.I.R.O.,

State Surgeon, Rajgarh State, C. I.

DHULI, a Mohammedan girl of 16 years, was admitted to the Impey Hospital, Rajgarh, C. I., on 24th October, 1930, with a necrosed mandible jutting out between the lips.

History.—A year ago Dhuli suffered from a fever which lasted for about 15 days. On the third day of the fever a white rash appeared over the whole body and faded away after five days' duration. A month later she got an acute painful swelling of the lower part of her face, following the contour of the mandible. There was severe pain, difficulty in opening the mouth, mastication was not possible, the breath was foul, and the saliva dribbled constantly. The patient stated that there was no fever or rigor, but considering that osteomyelitis of the mandible was going on so extensively this part of her history cannot be believed.

In a few days the left side of the face became the seat of an abscess which pointed and burst externally. The teeth fell out in another few days. For six months the inflammatory symptoms continued and then the necrosed horizontal ramus of the mandible gradually appeared between the lips.

On admission, the whole bone as far back as the angles was found necrosed, and was sticking into the tissues by its angles. There were no teeth in the lower jaw; there was a foul odour, dribbling of saliva and swelling of the face. A director could be passed between the lower lip and the lower border of the mandible, and could be moved from side to side to be checked only by the angles of the mouth. The general health was not much affected.

Treatment.—Oral hygiene was enforced for some days and then under chloroform the whole horizontal ramus including the angles was removed. Only the temporo-mandibular articulations on both sides were allowed to remain intact.

Subsequent progress.—After the operation the patient could move the jaw up and down quite well, because the articular portion of the bone was left intact and a thin horizontal ramus had grown in place of the necrosed bone. The periosteum was sound and there seems to be a good tendency for the growth of new bone. An artificial set of teeth is under contemplation.

CORRIGENDA.

We regret the following errata:—

(*i*) On p. 567, of our issue for October 1930 and on p. 57 of our issue for January 1931, first column, the name of the author should be "B. K. Wadia," and not "R. K. Wadia." In Dr. Wadia's letter in our January 1931 issue, the phrase "on the advice of Shahmurg, the father of Zal" should read "on the advice of Shahmurg to the father, Zal." (Zal was the father, Rodabe the mother, and Rustom the child delivered by Cæsarean section, *circa* 5000 B.C.)

(*ii*) On pp. 24 and 25 of our issue for January 1931, Dr. Kurup's qualifications should read "L.C.P.S. (Bombay), L.M.P. (Madras)," and "M.R.C.P.S. (Ind.)" should be deleted. The so-called "Royal College of Physicians and Surgeons of India"—(but, more accurately, of Dacca)—has, apparently, ceased to exist! In Dr. Kurup's first article in the January 1931 issue on p. 24, the date "2nd September, 1930," should read "2nd August, 1930."—(ED., *I. M. G.*).

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Indian Medical Gazette.

MARCH.

TUBERCULOSIS IN ANIMALS AND MAN.

Mycobacterium tuberculosis is a micro-organism with an apparently universal distribution and a wider field of morbid activity than any other, with the possible exception of the Streptococcus. Man, of all races and at all ages, is liable to be attacked; circumstances determine the extent to which his various tribes are ravaged and the individuals exhibit varying degrees of susceptibility, but none are immune; other primates are extremely susceptible; and other mammals and birds, both domestic and wild, may all, in certain circumstances—in some usual, in others unusual—become victims of the numerous pathological conditions which this organism is capable of producing; whereas infection of reptiles and fish by an organism morphologically similar to the *M. tuberculosis* is not at all uncommon.

The worker on tuberculosis is faced with a great problem, but at the same time this very universality of the disease has given him a weapon of research which workers in most other fields lack, namely, the comparative method. In the case of other diseases it is often possible to infect animals deliberately by artificial means, but the tuberculosis research worker is given an opportunity of studying the disease in animals that have acquired it in circumstances which, if not natural, are at least comparable to those of man living under conditions of civilization. Dr. H. H. Scott has taken advantage of this fact to its fullest extent and has made an extensive comparative study of the disease in man on the one hand and in wild animals in captivity on the other, basing his observations on the post-mortem findings in the former case in 300 persons dying of tuberculosis in Hong Kong, and in the latter in some 117 mammals, birds and reptiles which died from the same disease in the Zoological Gardens in London. The detailed reports in these two sets of observations, together with studies on the comparative anatomy of the lymphatic vessels of man and other primates, and on other closely associated subjects—such as mycosis in birds—have been published by the Medical Research Council and issued as a special report (No. 149).*

Amongst certain uncivilized tribes who live out of contact with the rest of the world tuberculosis is unknown; in thinly populated areas, as for example the Steppes of Russia, the disease is rare and usually confined to imported cases, but as one approaches the large centres of civilization the disease becomes more and more prevalent until the large towns are reached where as the result of tuberculin tests it is estimated that 97 per cent. of the adult population are infected. With the rise in the morbidity there is, fortunately, a corresponding fall in the mortality rate amongst infected persons and, whereas amongst a normal town population it is comparatively low, when members of aboriginal tribes come to live in large towns or when the disease once gets a foothold in such tribes, the mortality rate is alarmingly high. A similar state of affairs exists amongst other mammals, and amongst birds. As far as it is known the disease does not exist amongst monkeys in their jungle homes. When, however, these unfortunate beasts are caught, herded together in small cages and brought into close contact with tuberculosis-infected human beings and other animals, they soon become infected, and when they are once infected the disease runs a very rapid course. Even in large zoological gardens, where the present tendency is to keep animals under comparatively hygienic conditions and where careful segregation of new arrivals is practised, tuberculosis is one of the most important causes of death amongst the exhibits. The wild animal in captivity forms a parallel to the member of an aboriginal race brought to live under conditions of modern civilization; the counterpart of the town-living man is the domestic animal. Domestic animals of practically every species are susceptible to the disease, but, as in the case of civilized man, the mortality amongst them is not high. Carnivores are less frequently affected than the Bovidæ, but both the domestic cat and the domestic dog are far from immune, the former being infected only by the bovine type of tubercle and the latter most frequently by the human type. The gallinaceous birds are all susceptible, but the duck, the goose and the turkey appear to be less frequently infected than other members of this group. Amongst domestic animals and birds the disease does not usually run a rapid course and the recovery rate must be high; on the other hand amongst animals in captivity the course of the disease is usually extremely rapid, so much so that emaciation, one of the main characteristics of chronic infections, is frequently absent.

Dr. H. H. Scott claims that the course of the infection in wild animals in captivity is the "natural" one and that where one wishes to study any particular points, such as the portal of entry and the subsequent course of the infection, primates—other than man—living in captivity, who share with man so many anatomical features, form excellent subjects for comparative study, and he has shown how the early lesions and the course of the disease in these

*Tuberculosis in Man and Lower Animals. By H. H. Scott. Special Report Series, No. 149. Privy Council, Medical Research Council. London: His Majesty's Stationery Office, 1930. Price 4s. net.

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animals can be compared to that in young children, in whom again, he claims, the disease runs a more "natural" course than in adults.

The necessity for exact knowledge as to the usual portal of entry of the infecting organism is important in this disease, as in any other, in formulating prophylactic measures to limit its epidemic or epizootic extension. In Dr. Scott's series of post-mortems there are a large number in which, although the subjects were extremely young, the lesions were very extensive, so much so that one is driven to the conclusion that in some of these the infection was congenital. However, evidence on this point from other sources is contradictory, and at any rate one can be satisfied that the congenitally infected form a very unimportant percentage of the total of tuberculous subjects. Even the theory of the tuberculous diathesis is losing ground in these days as it is being realised that the environmental condition of those born of tuberculous parents is the all-important factor. As a portal of entry the skin must also be considered to play a very unimportant part. There remain the mouth and nasal passages; it is undoubtedly through these that the mycobacterium enters in the very vast majority of cases. The problem, however, only commences here as the important point is, which direction does the organism take after passing through the pharynx? It has been shown experimentally that the respiratory tract is much more vulnerable than the alimentary. The mucosa of the alimentary tract in the guinea-pig, at any rate, can deal with many millions of tubercle bacilli without becoming infected, whereas a comparatively minute dose insufflated into the bronchi will give rise to a lung infection with the utmost regularity. The intestinal mucosa is continually in contact with a fluid swarming with organisms of a large number of different species so that its powers of resistance must be very high indeed, and it has been shown that of children fed over long periods on tuberculosis infected milk only a very small percentage acquire the infection. This is not the case with the lungs; under normal conditions the air-borne organisms which reach the lung alveoli must be comparatively very few in number, and we know from experience that under special conditions, when this number is raised or when the resistance of the lung is still further lowered by irritation from dust, the incidence of lung infection rises rapidly.

It is not an easy matter to decide even on the post-mortem table whether in a given case the infection was primarily a lung or an alimentary one. A primary lung infection may be followed very rapidly by an alimentary one through the swallowing of infected sputum, which neither children nor other mammals of any age expectorate. Conversely, alimentary infection usually leads to early involvement of the lymphatics, there is extension along these until the thoracic duct is reached, the bacilli reach the pulmonary circulation and a miliary infection of the lung is the result. Dr. Scott found that amongst his 300 Chinese post-mortem subjects isolated primary intestinal tuberculosis was very rare, being detected only in four cases. This figure is very much lower than that usually given for Europe and North America, where it has been placed as high as 25 per cent. If all the cases in which the infection was considered to be primarily alimentary are taken, the percentage in the Hong Kong series is only 12.33. Dr. Scott places the percentage of primary lung infections at 72. Thus the proportion of primary lung to primary alimentary infection is 6 to 1, which is very much higher than the proportion in temperate zones. Too much stress should not be laid on this difference as unless the standards of the observers are identical there is room for a very wide margin of error. Even when the utmost care is exercised a healed primary focus, which had led to the secondary infection of the other system, might be overlooked. If we felt competent to criticise Dr. Scott's most excellent work the comment we should offer would be that in this matter he has taken a rather too dogmatic attitude. In many cases it must be quite clear, but we should have thought that the number of the cases in which there was real doubt as to the location of the primary focus would have been greater than he has shown.

We have not attempted to give a résumé of this extremely important and stimulating report but have only touched on a few of the points with which it deals. We hope that the report will be as widely read as it deserves to be.

Special Article.

BRITISH SPAS: THEIR WATERS AND METHODS OF TREATMENT.

(An Extract from Lectures given in the University of London.)

By CHARLES W. BUCKLEY, M.D., M.R.C.P. (Lond.),
Hon. Physician to the Devonshire Hospital, Buxton.

MINERAL WATERS are amongst the most ancient of our methods of treatment and flourished side by side with many remedies which have fallen into disuse or disrepute with a wider knowledge of physiology and pharmacology, but the use of mineral waters has steadily gained in popularity and reputation, a fact which is in itself a strong indication of their value. Two British spas were in use in Roman times, and one spa hospital had its foundation in Queen Elizabeth's reign. It must be admitted, however, that empiricism was for too long the sole basis of spa treatment, and it is only of late years that the action of mineral waters has received the attention of the biochemist, with the result that many, if not all, of the claims made have been justified, though the explanation of the means by which they exert their curative effects has often been different to what had previously been believed.

The selection of a suitable spa for any given case may be very difficult, but upon a wise choice much

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may depend. One patient may require strong measures which would be harmful to another, and it may be an awkward dilemma for the spa physician to whom a case is sent which is unsuitable for the methods or waters at his command. If he advises the patient to go elsewhere he may shake his confidence in his doctor's judgment; if, on the other hand, he uses such methods of treatment as he thinks will at least do no harm, the result is likely to be less satisfactory than might otherwise have been the case, and the reputation of the spa or even of balneotherapy generally suffers. It is the object of the Committee for the Study of Hydrology in Great Britain to do something to remedy this, to provide opportunities for students and medical practitioners to study the subject, and to define more precisely the sphere of usefulness of hydrology as a mode of treatment, and the different spas and their waters in particular through the medium of scientific research.

Great Britain possesses a wide range of mineral waters, the only type missing being arsenical waters. It will be convenient to study first those which are used internally chiefly, namely, the waters of Cheltenham and Leamington. While both should be classed with the muriated or salt waters if we consider the predominant constituent, sodium chloride, they differ from other waters of this class in containing small amounts of the sulphates of magnesium, sodium or calcium. It will be noted if the analyses of these and other mineral waters are studied that they are relatively weak in mineral constituents. An artificial solution of the salts which they contain in the same proportions would not by any means have the same effect, and this is characteristic of mineral waters generally. The explanation may be that the mineral constituents are not present in the combinations which are represented by the analyst but rather in the form of free ions to some extent; this is certainly true of the waters of low mineralisation which are radio-active, but in the group we are considering there is little doubt that the salines are present in the combinations shown in the analyses. It may be that they possess peculiar activity as being in the nascent form, or that the effect depends upon peculiar combinations of the salt, one acting as adjuvant to another.

It is at any rate true that the analysis of a water throws but little light on its therapeutic action and we must depend largely on clinical observation supplemented by the work of the biochemist.

Cheltenham possesses four chief springs differing slightly in composition. They resemble in general those of Marienbad or Karlsbad, differing, however, from the latter in that they are cold. The Cheltenham waters possess the advantage of combining the sulphates of magnesium with those of sodium, and they are the strongest in sulphates of any British spa.

The Fieldholme spring is used in gastric hyperacidity, sthenic dyspepsia, obesity and plethoric states, chronic constipation, hæmorrhoids, and glycosuria associated with obesity. The Lansdowne, or sodium sulphate saline, is similar to the Kissingen waters, and is used for the dyspepsia associated with anæmia and in chronic gastro-intestinal catarrh. The Pittville or alkaline saline is said to be the only natural alkaline water in Great Britain, but this might be disputed by the alkaline sulphur springs of Harrogate, though these belong to another class. It is very similar to the Marienbad water and is used for torpid liver, biliary catarrh, gastro-duodenal catarrh and gallstones, mucous colitis and glycosuria. The Chadnor source contains a larger proportion of calcium salts than the rest and is used in gravel and certain renal conditions.

Cheltenham has the advantage of a climate which is well suited for those suffering from the effects of residence in tropical countries, for whom its waters in many cases afford an excellent "cure."

Leamington, though also of the muriated sulphated class, differs from Cheltenham in certain important respects. There are three principal springs, one of which does not contain the alkaline sulphates, but only that of calcium, while in all three the calcium sulphate predominates over those of sodium and magnesium. Consequently the laxative action is slight and only results from large doses. The water may be compared with that of Homburg, differing chiefly in the absence of CO_2 and thus having no effervescence. Its chief action is on the stomach, relieving catarrh and having a tonic effect on the digestive system. It also acts as a diuretic.

Woodhall Spa possesses another variety of the class of muriated waters, distinguished by the appreciable quantities of iodine and bromine it contains. Its saline content is high, making it hypertonic; it contains chlorides of magnesium and calcium in addition to sodium. Its proportion of combined iodine and bromine is said to be unrivalled. Its action is sedative and tonic to the gastric and intestinal mucous membrane in small doses, but it excites the gastric secretion in larger quantities, improving digestion and appetite. In full doses fasting it is purgative. After absorption its chief value is said to be in its action on metabolism, promoting the absorption of rheumatic deposits, inflammatory exudations, reducing enlarged glands, goitre, etc. It has a special vogue for certain diseases of women, menorrhagia of functional origin, sterility due to chronic inflammatory conditions of the uterus or cervix and the late results of perimetritis or parametritis.

The next group for consideration is that of the sulphur salines, which are so well represented in this country at Harrogate, Llandrindod, etc. The sulphur is chiefly present as H_2S with some other sulphides in some springs, from 14 cubic inches per gallon in the radium sulphur well at Llandrindod to very small amounts in the weaker springs. Those waters of the group which are hypertonic, such as the Harrogate Old Sulphur, are the most strongly laxative, a quality which diminishes in proportion to the saline content to a great extent, though the laxative action is probably assisted by the sulphur. They all have an action in increasing metabolism, are diuretic, and cause an increase in the total nitrogen excretion. Experiments have shown an increase in the excretion of uric acid and creatinine, and an action on the liver as demonstrated by an increased excretion of bile and bile solids.

Besides the sulphur salines, Harrogate possesses a group of alkaline sulphur springs which may be mentioned here. In them the chlorides and sulphides are much less in quantity and the alkaline carbonates predominate; the one termed the magnesia water is the most diuretic of all, the others are chiefly used for bathing purposes.

The therapeutic indications for the waters of this group are disorders of the liver and digestive tract, glycosuria, obesity, gout,—especially of the plethoric type—some diseases of the skin, and conditions generally associated with defective metabolism and elimination. To differentiate between the different spas is a task which could only be satisfactorily performed by one acquainted with them all, but the most useful lines upon which to make a choice are considerations of climate and general amenities; one patient prefers amusement, another quietude, one requires a bracing climate, another will do better in a milder and sedative air.

I have omitted dealing with Strathpeffer among the other sulphur spas because the waters are pure sulphur and free from chlorides, they also contain alkaline carbonates. This absence of chlorides is claimed to render them especially suitable for gout and renal conditions. There are four chief springs of differing composition. The Sutherland well which contains more $MgSO_4$ than the rest is mildly laxative, the Cromarty well has 23 cubic inches of H_2S to the gallon, an amount greatly in excess of any of the sulphur saline springs. They are used for gout and renal disorders, rheumatism, skin diseases, and atonic and catarrhal conditions of the digestive organs.

We now come to the waters of low mineralisation, those of Bath and Buxton, though the former has also affinities with the calcareous group. They are the oldest spas in the country with a reputation going back to Roman times. Their low mineral content has made it

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difficult to explain their proved value clinically, but as has already been pointed out, the analysis of a water is of little service in determining its therapeutic value. The discovery of their strong radio-activity has thrown some light on their efficacy and recent investigations promise to elucidate the problem further and to establish their value on a basis of experimental proof. A preliminary investigation has been made in Buxton to test the effect of the gases and the radium emanation. With the same subject, on the same diet and under exactly similar conditions, observations were made with the natural mineral water fresh from the spring, and compared with the effects produced by the water after having been bottled for three months and aerated with CO_2, thus removing the nitrogen while the emanation was dissipated by the lapse of time. The volume of urine excreted was measured hourly, the excretion of urea and uric acid measured, also NaCl, ammonia, amino-acids and creatinine; the total acidity was also determined. The detailed experimental results are very interesting, but will be published when the experiments are complete. The following summary will, however, serve to demonstrate the importance of the gases and radium emanation.

	Water without gas.	Natural water.
Average output per hour (9 observations)	31.4	67.5
Total nitrogen, milligrammes ..	515	560
Urea	918	1,004
Uric acid	29.9	30.9
Sodium chloride	369	504

The hourly excretion with the water freed from gases and radium varied from 28.5 to 35, but with the natural water it varied from 27.5 to 168 c.c., showing a marked diuretic effect at certain periods. The diet was purin-free for the whole period of the experiment, and for twelve hours before the first specimen was taken.

These observations appear to be of great importance in establishing the fact that the action of the Buxton water and others of the same class is to a great extent dependent on the gases and the radium emanation. Both waters are naturally warm, the Bath springs having a temperature of 117°F. to 120°F., those of Buxton 82°, Matlock with a similar water at 68° is sometimes included, but is little used.

Bath differs from Buxton in containing chiefly calcium sulphate as compared with calcium carbonate. Both waters are gaseous, containing nitrogen and CO_2, Buxton being one of the strongest nitrogenous waters known. The nitrogen is the vehicle of other rare elements, argon, helium and other end products of radium. They are notably useful in gout, rheumatism, gravel and many other conditions of defective elimination, they have a definite action on metabolism, tending to reduce the production of uric acid and to eliminate the nitrogenous products in more soluble forms.

The British iron waters are of two classes, the carbonate of iron waters and the sulphate of iron waters. We have not an effervescent carbonated water like that of Spa, but there are good examples of the simple ferrous carbonate type at Strathpeffer, Buxton and Harrogate, these being in order of strength. These dilute solutions are readily absorbed without interfering with digestion or causing constipation and might be more widely used with advantage.

There are two strong springs containing ferrous sulphate at Trefriw in North Wales in delightful scenery, the stronger containing 380 grains per gallon. They are of value in anæmias and debilitated conditions.

The external methods of treatment in vogue in the British spas are of three kinds: (1) Those in which the mineral waters are used and which owe their characteristic effects to the nature of the water; (2) those in which the usual town supply is used for douche and douche massage while immersion baths are artificially prepared, as for instance by the addition of salt, sulphur compounds, pine extract, etc.; (3) electrical treatments and massage which do not strictly come under the heading of hydrology. All three methods may be in use at any one spa, but in general the radio-active thermal spas use their mineral water exclusively for immersion baths, douche massage, and Plombières treatment, as at Bath and Buxton; the stronger salt waters, as at Droitwich, are used for plunge and immersion baths, and the sulphur waters are used for immersion baths, peat treatments, and Plombières douches.

The external application of water in baths, etc., produces its effect by two chief means, thermal and mechanical, and to these we must add another of equal or greater importance, namely chemical. With the two first it is unnecessary to deal further, except incidentally, but the chemical effects concern our subject closely, as peculiar to mineral baths, natural or artificial. Though artificial solutions approach the natural in varying degrees, there is no artificial equivalent to the natural radio-active waters of Bath and Buxton, the artificial sulphur baths differ widely in composition and effect from the natural ones, and the artificial brine baths, while similar to the natural from the point of view of the analyst, do not appear to possess anything like the same potency. I shall therefore be content to deal with the effect of natural mineral waters in bathing and the chemical action they exert in addition to thermal and mechanical effects.

The immersion bath of natural water has several forms. The primitive one is the so-called "Wildbad" of German spas, in which the water is running continuously through the bath or pool from the springs to the outlet, the term implies water in its natural running, or perhaps nascent, condition as distinct from water which is stationary from the filling of the bath or which has been stored. In such natural baths the fullest effect of the mineral water is obtained, but there are comparatively few waters which can be used in this way, those that are cold must be heated, and those which are too hot for comfortable immersion must be cooled, in either process losing something of the natural qualities. For example, Bertier's observations at Aix-les-Bains, as quoted by Dr. Guy Hinsdale of the American Climatological Association, are as follows:—"Radio-activity at Aix-les-Bains diminishes very rapidly from the moment of the preparation of the bath. The mere fact of adding cold water and stirring is sufficient to lower the radio-activity of the thermal water 50 per cent.; subsequently the radio-activity is lowered more slowly. The following observations are in millicuries:—

Radio-activity of the water as it immerges in tubs (40°Cent.)	0.62
Radio-activity of the water as it immerges in tubs at 36°Cent.	0.31
Radio-activity of the water after ten minutes	0.25
Radio-activity of the water after twenty minutes	0.20

The radio-activity of a current of thermal water flowing in the bath is maintained at 0.34. In the pool which has a large surface exposed, in spite of the large current of sulphur water which continues to flow in, the radio-activity is lowered to 0.157, the temperature remaining at 38.5°C. Consequently to obtain the highest radio-activity it is necessary to use the thermal waters on their emergence."

It is to be noted, however, that the emanation given off will remain in the air above the bath together with the gases discharged from the surface, which are more strongly radio-active than the water, and act as the vehicle of the emanation. Thus the bather, in a natural plunge bath, such as that of Buxton, besides being immersed in the running water, is continually breathing a highly radio-active atmosphere, and is, in fact, in a natural emanatorium. The importance of this can be deduced from what has already been said upon the action of the gaseous and volatile constituents of the radio-active thermal waters when considering their internal use. It would seem that the actual strength in the emanation at the source is of little importance,

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what matters is the strength in this respect at the time of using, since it is lost so rapidly. If the water is bathed in at the source, as in the Buxton plunge baths, the full value is obtained, but if the water is stored, heated, cooled or otherwise modified, the strength in emanation is much reduced. The large swimming baths at Buxton are the only true "Wildbader" in England, but in Bath some of the large pool baths are arranged with a continuous supply of running water at such temperatures as may be prescribed, the swimming baths are not running water baths, as the temperature of the spring is too high and the hot water is diluted with a proportion of cooled mineral water and administered generally about 100°F. Besides the swimming baths large private immersion or pool baths are provided at each spa, those at Bath holding from 500 to 800 gallons of mineral water, and those at Buxton rather less, the temperature in each being specially prescribed and attained at Bath by cooling, at Buxton by warming the natural water. A new method of heating has been installed at Buxton for a special type of bath designed to retain the radio-active properties to the utmost. The water from the springs passes through a special type of calorifier which raises it from 82°F. to 90°F., and goes on to the bath through which it runs continuously, thus keeping the character of a natural or running water bath while, although warmed, it retains its full radio-activity because it has not been stored or allowed to come into contact with the air till it emerges in the bath.

In all these types of bath the patient is completely immersed and under the full influence of the mineral water. With the physical effects of temperature, etc., we need not deal, but there is no doubt that the character of the water greatly modifies the effect of the bath. On emerging from the natural baths the skin of the patient is covered with minute bubbles of gas, and it is probable that osmosis takes place through the skin in addition to the inhalation of the gas from the surface of the water. At Bath a special feature has been made of the treatment of paralysis in the deep baths, advantage being taken of the supporting effect of the water to carry out movements designed to relieve spastic conditions and to restore function where possible in paralysed muscles.

In the treatment of rheumatic, gouty and other conditions in baths of this type, an undercurrent douche is generally used at a higher temperature than the bath, and is directed upon the affected joints or other structures. It stimulates the circulation, promotes absorption of exudates and relieves pain; it is notably effective in the treatment of sciatica, exerting a deep massaging effect without causing pain. The bath may be preceded by vapour or radiant heat baths, or by peat or other packs to special joints.

Immersion baths are also an important feature of the methods of treatment in use at Droitwich and other spas possessing salt waters. The Droitwich brine is exceptional in many ways, it is the strongest known and is radio-active, probably to this latter quality must be attributed the fact that the clinical results of these natural brine baths differ to a remarkable degree from the artificial ones; the emanation given off from the surface will affect the bather and, in addition, there is some evidence that the presence of radium affects the ionic activity of the other saline constituents. The density of the brine is such that the bather floats on the surface of the bath unless kept immersed by special means. These baths act both as a stimulant and revulsive in painful myalgia and fibrositis, and rheumatic and gouty joint affections. The use of active and passive movements is greatly favoured by the density of the water and a special feature is made of orthopædic treatment. The strong saline water exerts a powerful stimulating effect on the cutaneous nerve endings, its effect being both direct and reflex.

Woodhall Spa has a hypertonic salt water, though it differs greatly from that of Droitwich; its peculiar features have already been described. It is used in immersion baths for rheumatic affections and is stated to be capable of reducing morbid deposits in this way.

The large group of sulphur saline waters of Harrogate, Llandrindod and elsewhere, when applied externally, owe part of their action to the NaCl, as in the previous group, and part to the sulphur. Most of them are hypertonic, with the exception of the Old Sulphur Well at Harrogate. The alkaline sulphurs of Harrogate are largely used for bathing purposes, especially in various forms of hyperæmia of the skin, relieving irritation and exerting a mild antiseptic action. The external action therefore of this large group of sulphur waters is dependent on three factors, and the effects will be varied according to the predominating constituents. The chlorides act on the cutaneous nerve endings as a mild stimulant, the alkaline carbonates will have a sedative action and a macerating effect on the epidermis, which is of value in such conditions as seborrhœa and psoriasis, while the sulphur will exert its specific influence on the skin as well as its mild antiseptic effect.

The chalybeate springs are not used externally to any great extent. Carbonated chalybeate baths are given on the Schwalbach principle at Buxton and Harrogate, and the sulphate of iron water is used for baths at Trefriw. The action is tonic and astringent.

Artificial aeration of immersion baths is largely used at some spas, the effect being to enhance their action by the stimulation of the cutaneous nerve endings by the minute bubbles of gas, and where oxygen or CO_2 are used for aeration the inhalation of these gases is likely to affect the bather to some extent; where the aeration is produced by compressed air, there is, of course, no such effect. The action of an aerated bath of plain water thus acts in two ways, first through the thermal effect of the temperature of the water and, secondly through the mechanical influence already referred to. If a gaseous radio-active water is aerated the action of the added gas will be to extract the emanation from the water and to increase the rapidity of its inhalation, thus to the effect of the bath itself is added that of an emanatorium which is usually a room filled with the gases and emanation extracted from the water by artificial means.

The contrast bath, which is chiefly used at Cheltenham, is a local bath for hands or feet. The process consists in an alternate immersion for short periods in water first hot and then cold. It is very useful in Raynaud's disease, chilblains and certain forms of local œdema.

The Nauheim bath which, artificially prepared, is very much used in this country for the treatment of cardiac disorders, is a saline bath containing sodium and calcium chlorides, and in the stronger form is artificially aerated by chemical means as a rule. There are several strengths, both of saline constituents and of aeration. The action is to stimulate the cutaneous nerves and to tone up the peripheral circulation. In the saline spas the natural mineral water is used.

Peat is extensively used in the form of baths and packs at Strathpeffer, Buxton, Harrogate and Llandrindod. It is obtained from the moors in the vicinity, and after suitable treatment to reduce it to a powdery consistency and to remove stones, etc., is mixed either with the mineral water of the spa, sulphur, radio-active or chalybeate, and used either as a bath for the whole body or as packs for specified joints or other parts of the body, it is usually followed by douching or a needle or immersion bath of the mineral water, or a plain water, as may be prescribed. The action is chiefly that of a poultice and higher temperatures can be borne than are tolerable in a water bath. The peat contains iron and various organic salts and acids which have a chemically stimulating action on the cutaneous nerve endings.

Mud baths are similarly prepared and similar also in action. At Bath they are prepared from a local supply of "Fuller's earth." At Woodhall a special mud is used which is obtained from the neighbourhood of the springs, and packs are also used, made with the "mother-lye," a specially concentrated mineral water, the iodine content of which is thus brought into play under very favourable circumstances for its action.

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The use of hot abdominal packs of peat, mud or 'mutterlaüge' such as are obtainable at many spas used in conjunction with hot douching both internal and external is of great value in gynæcological conditions, and in combination with suitable climatic treatment often yield excellent results.

Peat and mud are employed in chronic rheumatic affections and rheumatoid arthritis, fibrositis, sciatica, and chronic inflammatory conditions of the pelvic organs. French authorities have advocated their use in trophic disturbances connected with varicose veins, and phlebitis would appear also to offer a favourable field for their use.

Douche massage is one of the most popular methods of treatment at the present day. It is in use at all the spas in one or other form, sometimes with mineral water, but oftener with the usual supply from the public mains. There are three chief methods. The Aix douche was first devised at Aix-les-Bains; the patient sits on a stool or lies on a sloping board, while one, or more usually two, attendants vigorously rub and massage the whole body, playing a stream of water on the part under treatment from a douche carried over the shoulder. In the Vichy system the patient lies on a board, or in the more luxurious forms on a waterbed, while above is suspended a pipe from which a series of douches play streams or sprays of water upon him, massage being carried out by the attendant all the time. In the Buxton method the patient lies in a shallow pan or bath of mineral water, partially immersed, and the attendant massages him under a stream of water from a douche over his shoulder as at Aix. The treatment is generally concluded by a needle bath and a direct douche to the spine and limbs.

The methods have each their special advantages, the Aix method is the most vigorous; the Vichy, used with a strong spray douche, is a very potent stimulant and tonic treatment, while the Buxton system, owing to the immersion of the body in water, secures greater muscular relaxation and permits of deeper massage and douching, rendering it specially suitable for rheumatic conditions.

The Plombières method of intestinal lavage, which was introduced into this country about twenty years ago, has rapidly gained in popularity as its usefulness has been demonstrated not only in cases of mucomembranous colitis but also in conditions of intestinal auto-intoxication. It is now available in most of the spas. The waters of Buxton and Bath most nearly resemble that of Plombières; they have a sedative action on the mucous membrane and by mechanical action remove the mucus and retained matter. The saline waters are more solvent in their action and the stronger ones may be stimulating or even irritating. As a general distinction, and apart from any other condition from which the patient may suffer and which may have other indications, the sulphur salines may be preferred for the stout and lethargic with atonic constipation, and the radio-active thermal waters for the thin æsthetic type with spastic constipation or irritability of the bowels.

Sprays of finely-divided mineral water for local application to the throat and nose are widely used at Buxton, Bath, Harrogate and Woodhall, with good effect in chronic catarrhal conditions of the respiratory tract, especially of gouty origin.

Mention may also be made of the use of the chalybeate waters as collyria in conjunctival catarrhs. They have been in use in Buxton for very many years and yield excellent results.

I have endeavoured to give a description of the mineral resources of the British spas and to compare their waters and baths as impartially as possible. It is, however, impossible for anyone to do full justice to so complex a treatment as that by mineral waters unless he has actually studied each of them on the spot for a considerable time, and this is my apology for any faults of omission or undue preference of which you may deem me guilty. For further information I recommend the study of Weber's *Climatotherapy and Balneotherapy*, Fortescue Fox's *Medical Hydrology*, and Neville Wood's *Health Resorts of Great Britain*; there are many others, but none to surpass these for thoroughness and lack of bias.

Climatic considerations will necessarily influence you in the choice of a spa for your patients, and the books I have mentioned will help in this respect; it would be outside my subject for me to attempt to deal with climate. The attractions of a spa must also be considered; some prefer gaiety, others quiet, some seek for music and entertainments, others for country pursuits and recreations. The indications in some cases will be clear and in others difficult, and I would very strongly urge you to study the spas yourselves on the spot whenever opportunity offers. It would seem that all spas claim to cure rheumatism and gout, but it does not follow that any spa will do for any sufferer from these diseases, nor that every spa is as well equipped for their successful treatment. I hope that the efforts of the Committee for the Study of Hydrology in Great Britain will lead among other things to a diminution of the tendency to claim for a spa that it is good for every disease under the sun, and to define their respective spheres of usefulness more precisely to the advantage of science of hydrology, and ultimately of the spas themselves.

Medical News.

ANTENATAL WORK IN INDIA.*

THIS is the title of a small paper-bound handbook of 103 pages, written for nurses, midwives, and health visitors by Dr. Ruth Young, M.B.E., B.SC., M.B., CH.B., Women's Medical Service, and published by the Red Cross Central Supply Depot, Lahore, at 8 annas, plus postage.

The successive chapters deal with the objects of antenatal care, the antenatal clinic, the signs and symptoms of pregnancy, examination of the patient, the hygiene of pregnancy, its complications, syphilis, gonorrhœa and tuberculosis in relation to pregnancy, abortion and still birth, and the preparations for childbirth.

The book is clearly and lucidly written, and its publication should mark an important step forward in the promotion of antenatal work in India.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

Court of Governors Annual Meeting, November 28th.

SIR HARRY GOSCHEN presented to the Court of Governors of the London School of Hygiene and Tropical Medicine, the Report of the Board of Management, of which he is Chairman. The School and its predecessor had rendered most valuable services to the Colonial Governments in the staffing of the Colonial Medical Services with properly trained men, and the high standard of the courses of study in tropical medicine and hygiene were being maintained.

The financial situation was satisfactory up to a point, the Court of the University having secured to the School an Exchequer grant for a term of years at the rate of £40,000 per annum. The School, however, had to supplement this by voluntary effort, not only to meet the cost of the present programme, but to meet

**Antenatal Work in India.*—By Dr. Ruth Young, M.B.E., B.SC., M.B., CH.B., W.M.S., 1930. Red Cross Central Supply Depot, Lahore. Price 8 annas, plus postage.

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the cost of developments especially in regard to industrial medicine and hygiene, which were already pressing for attention. It was essential that a university institution such as this School, with large and increasing responsibilities, should be able to expand and develop, and for this it must possess a large endowment, independent of any Government grants, and be free from any hampering financial anxiety.

The Dean of the School, Professor W. W. Jameson, in the absence of Sir Andrew Balfour, presented the Report on the work of the School during its first year of occupation of the magnificent premises, the gift of the Rockefeller Foundation, which were opened by the Prince of Wales in July, 1929. He spoke of the way in which the various Divisions of the School had been equipped, the staffs completed, the students enrolled, and the methods of teaching re-designed and carried into effect with marked success. In the first academic year no less than 217 post-graduate students had attended the courses and a further 75 non-medical persons proceeding to the tropics had attended the lectures in tropical hygiene. The Dean referred to the valuable assistance rendered by the Seamen's Hospital Society whose recent extension of the Hospital for Tropical Diseases provided a centre for the teaching of tropical medicine in association with the School, of which the whole Empire might be proud. The Dean commended to the Court the School's activities in the Divisions of Medical Zoology, of Bacteriology, of Biochemistry and Chemistry, and of Epidemiology and Vital Statistics; as regards the Public Health Division, which be described as the general utility division of the School, he said that a valuable liaison was being rapidly established with the Public Health Services, not only in this country, but in all parts of the world. A beginning had been made with the teaching of Industrial Physiology and Medical Industrial Psychology, in both of which branches of study considerable problems were pressing for the attention of the School. The first year's experience of working with his colleagues in the new building led the Dean to say that not one of them had a single doubt as to the wonderful contribution which this School could make, whether by teaching or by research, or even by providing a meeting place for students with community of interests, in the great allied subjects of hygiene and tropical medicine.

THE SEAMEN'S HOSPITAL SOCIETY. LONDON HOSPITAL FOR TROPICAL DISEASES.

AN event of importance to the whole of the British Empire occurred on Thursday, 20th November, 1930, when the new wards, laboratories, and the "Manson" clinical lecture theatre at the London Hospital for Tropical Diseases were opened. With the opening of the big new London School of Hygiene and Tropical Medicine, the whole of the space originally occupied by the former London School of Tropical Medicine became available for hospital use. A fund was raised by Sir Leslie Wilson, and reached a sum of £13,000 This has rendered it possible to enlarge the hospital until it occupies the whole building, and to provide a clinical lecture theatre.

In speaking at this ceremony, Sir Walter Fletcher, K.B.E., C.B., M.D., F.R.S., Secretary to the National Council for Medical Research, spoke as follows:—

We are meeting here to-day surely under the happiest auspices. We are not here to inaugurate a new enterprise. What we celebrate to-day is a kind of birthday,—the beginning of a fresh stage in the life of an institution already famous for its work of charity to sufferers, and no less for its services to science and the Empire.

Few here need to be reminded, I think, of its history. The first birthday of this Hospital, considered as a home not only of large charity but of that larger charity that is unfolded from research and teaching, was in 1899, when the Seamen's Hospital Society, inspired by Sir Patrick Manson, whose name to-day we specially commemorate, and with strong support from Mr. Joseph Chamberlain, had the wisdom to allow a school of tropical medicine to be joined to the Albert Dock Hospital. After the vigorous years of youth, the coming-of-age of the combined Hospital and School was celebrated by their removal just ten years ago to this building, which we may regard as a twenty-first birthday present given to them by the British Red Cross Society and the Order of St. John.

Hospital and School flourished here together until about five years ago there came the events that have led to our meeting of to-day. The School of Tropical Medicine, Manson's creation, with its large (though let me hasten to say, quite inadequate) endowments was transferred to the great new building close by in Gower Street, provided by the munificence of the Rockefeller Foundation, and there it has become a corporate part of the London School of Hygiene and Tropical Medicine. The removal of the School was a nominal divorce, but not a separation in practice, for the Hospital and School, sharing in a distinguished common staff, co-operate in daily work by a free exchange of the facilities of each.

The School by its removal acquired larger, indeed palatial, quarters. Its removal from this building gave much needed room for the expansion and improvement of the Hospital. As you will see to-day, the ward space here has been enlarged, new special departments and a new operating theatre have been provided, with a range of well-equipped laboratories for pathological and biochemical studies. This new Manson lecture theatre for clinical demonstrations and other purposes of teaching has been constructed, and is to-day to be dedicated to the man who will be for ever acknowledged as the father of tropical medicine in this country. We shall recognise to-day the liberality and foresight of the Seamen's Hospital Society that have brought about these developments here, and we shall rejoice at the improved opportunities now opening before the distinguished staff of the Hospital, and their colleagues and near neighbours of the School of Hygiene and Tropical Medicine.

It needs no expert in tropical medicine to proclaim the value of this place to the whole Empire. If it did, I should certainly not now presume to be addressing you. I like any other man am able perhaps to say of the work here what those who have the knowledge to perform it would never say for themselves.

First and foremost, this Hospital is doing a great work of charity that makes an immediate appeal not only to the heart but to the romantic imagination. The patients coming here bring with them their tales of suffering from every remote corner of Africa or of India. They come from every part of the Empire lying overseas, from the Friendly Islands in the East to the Great Falls in Canada upon the West. Many of them are drawn from the contacts of our seafaring trade, from the coast of India, Ceylon and Burma, from the Gold Coast and from the Malay States. All classes are helped here without regard to colour, to creed or to social rank. The patients include officers and men of the mercantile marine, planters, engineers, missionaries, traders, the explorers who develop the Empire, and the servants of the State administering it in all its various and distant parts. The poorer patients are treated free; those who can afford it pay small or larger fees according to their means. This, as you well know, allows the great benefits of this specialised Hospital to be used by those who would never come to it, however small their means, unless they were allowed to contribute what they could afford in return. The demand upon the specialised services of the Hospital are clearly enough shown by the steady rise in numbers of patients. In the last two years alone the out-patients have grown from 1,350 to over 1,800, and the in-patients from 680 to 830.

The second great function of the Hospital is that of teaching. Specialised teaching in clinical tropical medicine is given as a normal part of the course for the London University diplomas in tropical medicine and hygiene. Special courses are given for medical men proceeding to work in tropical parts or who come home on leave from the tropics to keep themselves abreast of modern progress. It is to facilitate the

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increasing responsibilities of the Hospital for teaching that this new Manson lecture theatre has been provided. We must not forget, too, the quite inestimable value of the work done here in the training of nurses to meet the special problems of disease in tropical climates, and in giving courses of instruction to nurses trained elsewhere who are proceeding to the Tropics.

To these high functions in the relief of suffering and in the training of doctors and nurses we have to add a third, the function of research, rightly inseparable from the daily work either of the healer or of the teacher, and the only source of our hope of new progress in the cure and prevention of disease.

We know that the work here is great and indispensable. This is the chief centre of it, fitly placed in the capital city and the chief seaport of the Empire. That it should ever lack support in the most abundant measure from the State it serves and from men of good will with hearts or imaginations to be touched seems almost unthinkable.

We cannot celebrate these new phases of activity here without paying homage to the man whose creative intelligence and unselfish work brought all this about. The thoughts of all of us must go to-day to Sir Patrick Manson, to whose memory the theatre in which we are now meeting is dedicated for ever. Some here indeed were fortunate in knowing him not only as a teacher, but as wise adviser, and warm-hearted personal friend. He died in 1922, the year after the Hospital and his own School came to this building. The country lost him at a time when the growth and development of tropical medicine here had reached some difficult and critical stages. We must not dwell upon the differences it might have made to us if his guiding mind had remained to help for a few years longer. But we can find no better pattern and example than those he set medical practitioners belonging to the later Victorian age.—Lister and Horsley among surgeons, Hughlings-Jackson, Gowers, Ferrier, Mackenzie and Head, among physicians, who with burning zeal and self-sacrificing altruism made their professional practice the servant of their scientific work. We look round with hope that the attitude and the spirit of men like these may arise among us again within the present reign. We can truly apply to Patrick Manson the words that Isaac Walton wrote of John Donne—"His mind was liberal and unwearied in the search of knowledge, with which his 'vigorous soul is now satisfied.'"

Never were we in greater need than now of the legacy he left us of inspiration and leadership. The gleams of knowledge we have already gained in the field of tropical medicine, or in any other field, do but show us how vast indeed are the spaces of our ignorance. We are under constant temptation to sit down satisfied with the first beginnings of new knowledge. Let me give you one instance out of many. Every cabinet minister knows now that malaria is due to a microscopic parasite transmitted by the mosquito. The contributions made to this chapter of medicine by the arduous work of Ross under the direct inspiration of Manson is much too often described in popular literature and in the press as if it were equivalent to the conquest of malaria. You do not conquer your enemy by merely learning who he is, how he is posted, or what his transport is. The Manson-Ross discovery was made in India a third of a century ago, yet to-day there are more, and not fewer, sufferers from malaria in India than then. Where is the conquest? What we have learned, though we have been slow enough to put it into practice, is that our campaign must be fought by a double strategy. One part of this work is spreading widely over many fields, of entomology and other parts of natural history, of sanitary engineering and of social and political science. By this the mosquito may be controlled, and only in so far as we are patient to adapt a different strategy to each of the numerous forms of the mosquito concerned in different areas and under each different set of environmental conditions into which the campaign is to be carried. Ask Sir Leslie Wilson here whether the fight against the mosquito in Bombay needs the same strategy and tactics as in rural areas or even in other cities, and ask him too, if he considers that there has been a conquest of malaria yet in any part of India! Ask Sir Edwin Lutyens how far the mosquito has interfered with his plans for the New Delhi!

But besides these extensive studies there is another part of our campaign. There are other studies of a more extensive kind to be followed that may take us deep into the biochemistry and immunology of the malaria parasite itself. It is not, perhaps, an idle dream that the true conquest may come by a short cut, either the discovery of what the antennæ of mosquito actually do and what chemical substance attracts them to their victims, or again, the discovery of a perfect chemotherapy. Is it not strange that though in this year we are celebrating the tercentenary of the introduction of "Jesuits' bark" to this country, physicians continue to use quinine without knowing whether that is the best of its numerous cousins among the alkaloids of cinchona bark, and that this Empire should submit to gigantic money losses for want of gaining and using scientific knowledge in the planting and management of cinchona plantations? What I have said in relation to this one disease I might multiply indefinitely by reference to other diseases no less destructive of life and money. This single example, however, is more than enough.

At the opening of these laboratories here we base our confidence for the future in the work of the past. I notice that a prominent surgeon lately, in opening the new Institute at Toronto that had actually been founded to commemorate the introduction of insulin for the treatment of diabetes by the physiological work of Banting and his colleagues, took occasion to belittle the work of laboratories, to declare physiologists to be aloof from medicine and to be somnolent, and said that he thought that the idea that the laboratory could and did hand over new weapons to the physicians was laughable. Well, we need not here use that Irish mode of encouragement!

We know the value of the work done here hitherto, and indeed the workers will continue it without notice of our praise or blame. The great new laboratories in the School of Hygiene and Tropical Medicine admirably allow for intensive work in the chief sciences serving tropical medicine, and allow, too, for its firm linkage with the applied sciences and arts of hygiene and sanitation. Here in this building the clinicians have laboratories for their own work, and in these we see the fruitful meeting ground of workers of different equipments and different training. These two linked institutions will find their strength in a true union in ideals and in work, and, more than this, they will use well their great advantage of enjoying the friendship and close neighbourhood of University College with all its scientific resources, which has an essential identity of interest with this Hospital, and finally, the Wellcome Bureau of Tropical Medicine with its laboratories and museum under the able direction of a man taught and inspired by Manson himself.

THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH.

An all-India Institute of Hygiene and Public Health is at present being built in Calcutta by the munificence of the Rockefeller Foundation. The building will be completed by the end of 1931, and early in 1932, the Institute will be opened for work. Prior to 1920, medical graduates in India had to go to England or elsewhere to study tropical medicine and hygiene systematically. This was obviously incongruous, and in 1914 Sir Leonard Rogers conceived the idea of establishing institutes in India for post-graduate study in tropical medicine and hygiene. Sir Leonard's first idea was that there should be a School of Tropical Medicine in Calcutta, and an Institute of Hygiene in Bombay, and that both of these might be on an all-India basis. Various circumstances and considerations prevented these views from coming to fruition, but it was chiefly owing to Sir Leonard Rogers' perseverance and enthusiasm, and the generosity of the Governments

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of India and Bengal and various private benefactions that in 1920 the Calcutta School of Tropical Medicine and Hygiene was opened which combined teaching and research in both tropical medicine and hygiene. A Professorship in Hygiene was established, and a course of instruction arranged in the School for the Diploma of Public Health of the Calcutta University. There were obvious limitations to the scope and outlook of this arrangement. However enthusiastic one man may be, there are now so many aspects of public health both of temperate and tropical climates, each of which is rapidly developing and requires the full attention of a single worker and teacher, that it is impossible for a single person to combine the qualities or to find the time necessary to assimilate, digest and teach the diverse subjects comprising the entity known as modern public health. Workers highly trained in general hygiene and specialists in some particular branch are needed in India, and as time goes on and public health policy broadens and expands in all Indian provinces, the need for such workers trained in Indian needs and with Indian experience will be more and more required. Major-General J. D. Graham, C.I.E., I.M.S., the Public Health Commissioner with the Government of India said in his Annual Report for 1925 (Section VIII):—

"*The need of providing training for public health workers.*—Certain conclusions have been forced upon me after careful study of the position over the last few years. It is becoming increasingly evident that a considerable section of the Indian community is thinking seriously on these public health problems.

This is a work which has to be done for the benefit of Indians. To be effective it must carry conviction and establish its position against immemorial conservatism and tradition, it must therefore be done by Indians. It presents a grand and unlimited field for public health workers, but it is well to recognize that the improvement cannot be achieved when the expert labourers are too few in number, that these cannot be increased to the requisite number without a careful system of specialized training in institutes or schools devoted to public health teaching and research, and that cannot be done without adequate financial support. The need for such training of Indian personnel has been advocated for the last two decades by our expert hygienists and research workers in India. It has often been represented, and not without justice, that scientific knowledge in regard to the prevention of certain communicable diseases has far outstripped its application in the field. It is with such a personnel that the practical application must finally rest."

As head of the Calcutta School of Tropical Medicine and Hygiene, Major-General Megaw arrived at similar views, which were expressed from time to time in the Annual Reports of the School.

Dr. W. S. Carter, M.D., Associate Director of the Rockefeller Foundation in his periodic tours of India and the Far East, met General Megaw and General Graham on various occasions and became deeply impressed with the necessity for establishing an all-India Institute of Hygiene. Much of the teaching in basic subjects, such as bacteriology and protozoology, for the Diploma of Public Health is similar to that for the Diploma of Tropical Medicine, and as this was being taught in the School of Tropical Medicine Dr. Carter at once grasped the obvious advantages of Calcutta as a location for an all-India institute, and of a site close to the Calcutta School of Tropical Medicine, where the basic subjects would continue to be taught. By this means it would be unnecessary to duplicate these courses, and at the same time the institute would deal with purely public health subjects especially related to Indian requirements. As a result of discussion with General Megaw and others,

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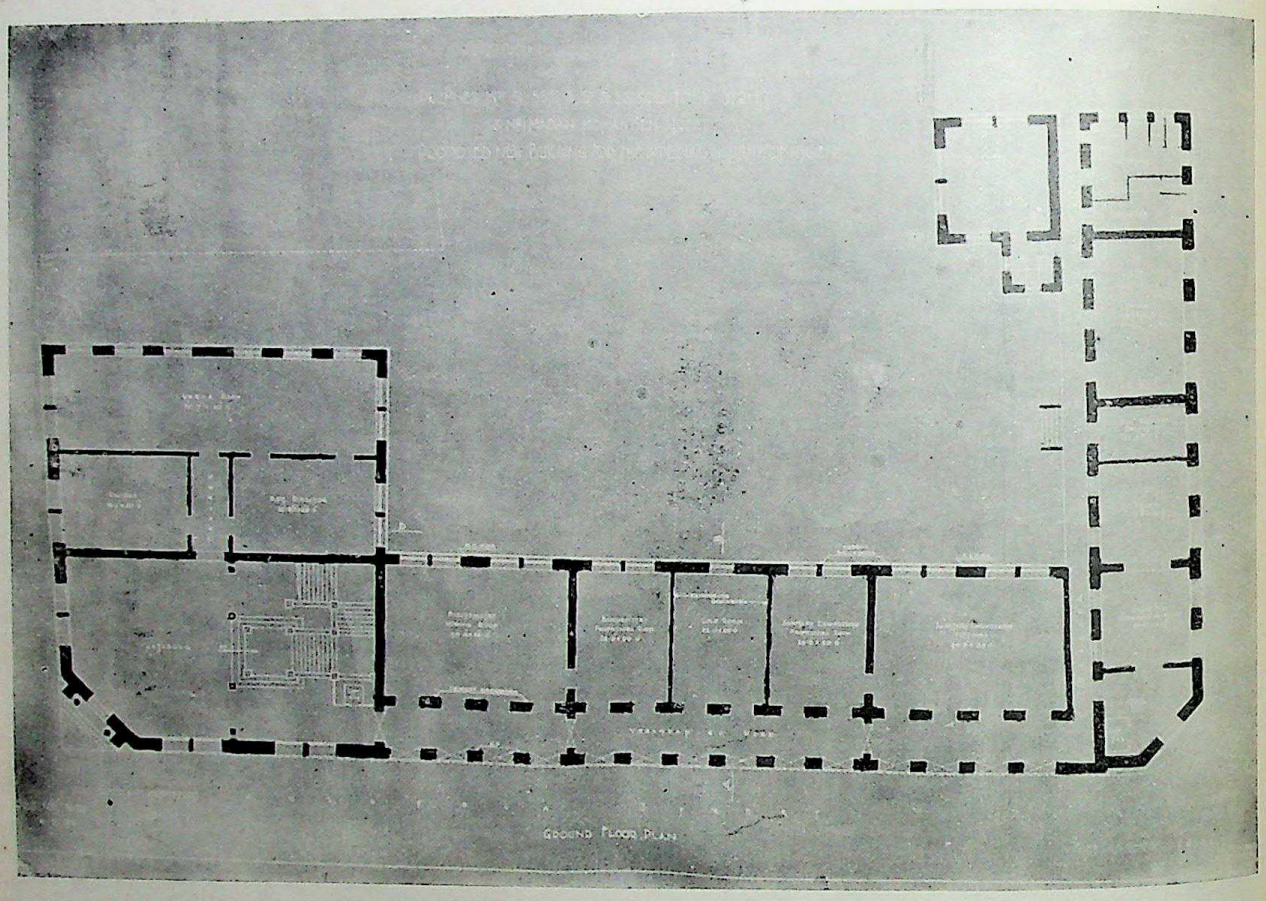
Dr. Carter on behalf of the Rockefeller Foundation addressed the Government of India in terms embodying these proposals, offering to provide the cost of acquiring the site selected, and to build and equip an all-India Institute of Hygiene and Public Health, and further asking for the Government of India's assurance that they would meet the recurring cost of staff and maintenance after the building was handed over to them. The Government of India gratefully accepted this munificent offer and negotiations for the acquisition of the site were commenced. This was acquired finally in July 1930 and the site was cleared and building commenced in September. A Constructional Committee composed of the Public Health Commissioner with the Government of India, the Surgeon-General with the Government of Bengal, the Chief Engineer with the Government of Bengal, the Chairman of the Calcutta Improvement Trust, and the Accountant-General Bengal, was appointed to arrange for the construction of the building. Lieutenant-Colonel A. D. Stewart, I.M.S., Professor of Hygiene in the Calcutta School of Tropical Medicine, was appointed Director-Designate of the new Institute, and Lieutenant-Colonel A. A. E. Baptist, M.B.E., I.M.D. (Retd.), Assistant Director, to superintend the actual details of construction and equipment. The Committee have entrusted the building of the Institute to Messrs. Martin & Co., Contractors, Calcutta, and have engaged Mr. T. Edmondson, Officiating Consulting Architect with the Government of Bengal, to advise them on technical points and to act as supervising architect. The site of the Institute practically adjoins the School of Tropical Medicine in Central Avenue, with which it will harmonise in design and appearance. The plan is based on the "unit room" system, the unit room being 25 by 21 feet. The building is four storeyed and is E shaped, the long limb being in the centre. Six sections will be accommodated, viz., (1) Public Health Administration, (2) Sanitary Engineering, (3) Vital Statistics and Epidemiology, (4) Biochemistry and Nutrition, (5) Malariology and Rural Hygiene, and (6) Maternity and Child Welfare and School Hygiene. Each section will be given one unit room for the head of the section and two unit rooms for the workers. The working sections are placed in the central limb of the building, facing north with an excellent and unimpeded north light. In the west block are placed the administrative rooms, lecture theatre, practical class rooms, museum, and a large auditorium to seat 200 people. The eastern limb will house store rooms, common room, and lunch room for students, spare working rooms and lavatories, while a separate annexe provides for an animal room on each floor. The library is in the centre block on the top floor. Three unit rooms on each floor and the library and reading room will be provided with conditioned air during the hot months of the year. The head of each section will thus have a cooled room and in addition there will be a spare cooled unit room on each floor where workers on that floor may work in comfort, or engage in any special work requiring a cooled atmosphere. The installation of the cooling plant has been entrusted to the Air Conditioning Corporation, Ltd.



Plan of the Ground Floor of the All-India Institute of Hygiene and Public Health.

Each section will be staffed by a Professor, an Assistant Professor, and laboratory or other assistants. The primary object of the Institute is to bridge over the gulf between the results achieved by pure research and their practical application to the community. Its function will therefore primarily be that of instruction. The subjects for the Diploma of Public Health, Part I (Bacteriology, Protozoology and Public Health Laboratory Practice), will continue to be taught by the staff of the School of Tropical Medicine, but the specialised subjects in Public Health will be taught by the staff of the Institute, each Professor dealing with his specialised subject. The examination for the D. P. H. is conducted by the University of Calcutta, with which the new Institute will in due course be affiliated. It is also intended to provide short post-graduate instruction in special subjects for public health workers desiring to pursue advanced study, and it is probable that the

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University will institute a higher degree or doctorate in public health science which will require a year's training in the Institute in some special branch of public health science. Considering the importance of maternity and child welfare work and public health nursing, it is contemplated that special courses in these subjects may be instituted for women graduates and nurses respectively. The Institute will be co-ordinated with the various aspects of practical hygiene and public health all over India, and it is hoped will able to render assistance to public health administrators and workers, and institute enquiries and investigations of a practical nature in the application of medical research and knowledge for the betterment of the Indian people.

The Institute building will, in the ordinary course of events, be completed by 31st December, 1931, and it is hoped to appoint the staff and to start work on the 1st January, 1932.

THE *LANCET* COMMISSION ON NURSING.

LORD CRAWFORD AND BALCARRES has consented to preside over *The Lancet* Commission on the position of nursing. The terms of reference of the Commission are to inquire into the reasons for the shortage of candidates, trained and untrained, for nursing the sick in general and special hospitals throughout the country, and to offer suggestions for making the service more attractive to women suitable for this necessary work. The members of the Commission are:

The Earl of Crawford and Balcarres, P.C., K.T., F.R.S.

Prof. Henry Clay, M.A., D.SC., late Professor of Social Economics in the University of Manchester.

Miss R. E. Derbyshire, R.R.C., Matron, University College Hospital.

Miss L. Clark, M.B.E., R.R.C., Matron, Whipps Cross Hospital.

Dr. Robert Hutchison, F.R.C.P., Physician to the London Hospital and to the Hospital for Sick Children, Great Ormond-street.

Professor F. R. Fraser, M.D., F.R.C.P., Professor of Medicine in the University of London, Physician to St. Bartholomew's Hospital.

Mr. A. Lister Harrison, J.P., Chairman, Committee of Management, Metropolitan Hospital.

Miss M. D. Brock, D.Litt., Headmistress, the Mary Datchelor Girls' School.

Mrs. Oliver Strachey, Chairman, Employments Committee, London Society for Women's Service.

Miss Edith Thompson, C.B.E., Member of Council, Bedford College, University of London.

Sir Squire Sprigge, M.D., F.R.C.P., the Editor of *The Lancet*, with Dr. M. H. Kettle, an assistant editor, as honorary secretary.

Any organisation or individual wishing to provide evidence for the Commission to consider, or to make proposals relating to the improvement of conditions of service of the nursing profession, is asked to communicate with the honorary secretary at *The Lancet* Offices, 7, Adam-street, Adelphi, London, W.C.

THE EIGHTH POST-GRADUATE COURSE IN OPHTHALMOLOGY, VIENNA, 1931.

THE eighth special course of post-graduate study in ophthalmology will be given between 1st October and 3rd December, 1931, under the auspices of the American Medical Association of Vienna at the I and II Eye Clinics of the Allgemeines Krankenhaus, Vienna, Austria.

This intensive post-graduate instruction was first originated in Vienna in 1922 as a result of a suggestion by Dr. Edward Jackson of Denver to Prof. E. Fuchs. Prof. J. Meller and Prof. K. Lindner, chiefs of the Eye Clinics, have again consented to take an active part. The other lectures will be given by Prof. A. Fuchs, the Docents Bachstez, Guist and Pillat, and Assistants Dr. Urbanek, Dr. Fischer, Dr. Böck and Dr. Subal. Professors, Docents and Assistants of other departments will deliver lectures in their respective subjects: Prof. Kolmer on comparative Ophthalmology; Prof. Schüller on Röntgen-rays; Prof. Hirsch on the Hypophysis and Sinuses; Docent Kofler on the modified West-operation; Docent Fuchs on Radium-treatment; Docent Pollitzer on Embryology.

The course has been so arranged that the field can be covered systematically and comprehensively in the allotted time. A preliminary knowledge of ophthalmology is pre-supposed.

Concerning operations only lectures with demonstrations will be given. In refraction only advanced work will be given. In ophthalmoscopy the non-electric ophthalmoscope will be used.

The entire course is given in English for a minimum of ten, and a maximum of sixteen men. The fee is $250 per man. Applications with a certified cheque for $100 should be sent only to Prof. A. Fuchs, Vienna, VII, Skodagasse 13. Applications are accepted in order of priority. The application fee will be returned if the application is cancelled before 15th September.

Further information can be secured by writing to Prof. Dr. A. Fuchs, Vienna, VII, Skodagasse 13, or to the American Medical Association, Vienna, VII, Alserstrabe 9, Café Edison.

INTERNATIONAL POST-GRADUATE COURSES IN BERLIN.

WE have been asked to announce that the following post-graduate courses will be held in Berlin during 1931:—

March-April 1931.

1. *X*-ray diagnosis and therapeutics. 22nd to 29th March. Fee R.M. 80.
2. Special courses in different branches of medicine each month.

October 1931.

1. A course in internal medicine.
2. A course in thoracic surgery.
3. A special course on urology.
4. A course on physical and dietetic treatment.

The information Bureau of the Kaiserin Friedrich-Haus, Berlin, N.W. 6, Luisenplatz 2—4, will be glad to supply full information about these different courses of study.

LIEUTENANT-COLONEL H. W. ACTON, C.I.E., I.M.S.

A VERY pleasant function took place on the afternoon of Thursday, 8th January, at the Calcutta School of Tropical Medicine and Hygiene, when the staff and ministerial establishment entertained Lieutenant-Colonel H. W. Acton, I.M.S., the Director, to tea on the occasion of the award to him by H. M. the King-Emperor of the C.I.E.

In conveying the congratulations of the whole School to Colonel Acton, Lieutenant-Colonel R. Knowles, I.M.S., dwelt upon the difficulties and responsibility of the Director's post. He attributed Colonel Acton's brilliant career in India to two main qualities, his capacity for organisation and administration, and his genius. He disagreed with the usual definition of genius as "an infinite capacity for taking pains"; in scientific research work, he would rather define genius as "an ability to see further through a brick wall than anyone else." Give Colonel Acton a problem at which other research workers had been bungling for twenty years, and he would soon grasp the essentials of the problem, outline a programme for investigation, and then get the right men on to work at it. Many examples of his work could be quoted. His early work on the Negri body of rabies had foreshadowed much later work on the diseases due to the filterable viruses. His introduction of the carbolised antirabic vaccine, in conjunction with Sir David Semple, Colonel Harvey and Major Fox, had conferred an inestimable boon on India by the introduction of a vaccine which was efficient and safe, and India to-day led the world in antirabic work. His work on the cinchona alkaloids during the war showed that the alkaloids other than quinine in cinchona febrifuge were of equal importance, and that alkalies should always be administered with quinine as they reinforced its action; this led to the present-day well-known Sinton's treatment with alkalies and quinine.

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His work on epidemic dropsy, which solved the problems of that disease, had shown its mode of causation, and the measures necessary to prevent it. In dermatology Colonel Acton and his colleagues had carried out most valuable pioneer work, introducing order, system and classification into one of the most confused fields of medicine. In conjunction with Dr. Sundar Rao, his work on filariasis had explained the geographical and seasonal distribution of the disease in India, why infection with one and the same parasite should give rise to such different symptoms in different areas, and had greatly improved treatment.

It took ten years to get a new discovery into the textbooks and thirty years or more to get a mistake out of them. He was glad to see that Colonel Acton's early work on snakes and snake venoms was now getting into the textbooks; his other work would get there in time and would profoundly influence the development of tropical medicine.

The honour was a belated one, but he trusted that it was an earnest of others to follow.

Dr. K. P. Banerjee, speaking on behalf of the assistant professorial and research staff, spoke of Colonel Acton's success as Director in running and harmonising so many and such diverse departments in the School. He compared him to a *guru;* the whole of the assistant professorial and research staff had been stimulated with the real spirit of research by Colonel Acton; he had taught them the lesson of the necessity for seeking out truth, even if the findings went against their preconceived notions.

Mr. J. N. Sur, librarian, speaking on behalf of the ministerial establishment, paid a tribute to the high standard of fame and of popularity to which Colonel Acton's work had raised the Calcutta School of Tropical Medicine. He hoped that further honours were to follow, and that Colonel Acton would long remain the head of the School, all the members of which owed him the greatest debt of gratitude and allegiance.

In replying Colonel Acton dwelt upon the loyalty of his colleagues and assistants. Unless you got the right type of man for research work, you would get no results. The whole success of the School was the result of loyal co-operation and concerted work.

Colonel Acton was garlanded, and a group photograph taken.

Current Topics.

The Place of Radium in the Treatment of Breast Cancer.

By W. SAMPSON HANDLEY, M.S., F.R.C.S.

(Abstracted from *The Practitioner*, Vol. CXXV, No. 4, October 1930, p. 453.)

THOSE whose memories of practice carry them back twenty-five years must realize on reflection the complete change which during that period has occurred in the outlook of sufferers from breast cancer. At the beginning of the period local recurrence in the region of the scar was the rule rather than the exception, though the operative method of Stiles and Cheyne in this country and of Halstead in America was beginning to bear fruit. The method of Stiles and Cheyne, which was founded upon the studies of Stiles on the mode of spread of the disease in excised breasts, laid stress upon extensive undermining of the flaps in order to remove the thin peripheral extensions of the breast, and was in this respect superior to Halstead's method, which demanded an unnecessary sacrifice of all the skin covering the breast, without undermining of the flaps.

A more complete study of the mode of spread of the disease showed that it extended in a circle from its point of origin by growing along the meshes of the fascial plexus, a process to which the name permeation was applied. It was then possible to formulate more completely the rules for the operation. The removal of an extensive circle of deep fascia ten or twelve inches in diameter, properly centred upon the primary growth, was shown to be the fundamental requirement in order to get beyond the growing edge in the deep fascia. The removal of the breast was an incident in the fulfilment of this requirement. Security against direct abdominal invasion through the tissues just below the ensiform cartilage was increased by removing a portion of the anterior layer of the rectus sheath in this situation. Removal of all the axillary glands, including the highest or subclavicular glands, in continuity with the breast, first demanded by Gross and Mitchell Banks, remained an essential of the operation, but the extensive removal of skin demanded by Halstead was replaced by the removal of a circle of skin only four or five inches in diameter. The diminution in the skin area removed and the increased undermining of the flaps allowed the suturing of the wound without tension and greatly diminished the severe post-operative shock which used to be the rule.

After this operation local and axillary recurrence is very rare, especially if a short course of prophylactic *x*-rays is given to the area when the wound is healed. But as the years went on and remote results could be studied it was seen that after all the ultimate results left much to be desired. For three years or so all went well. The horrible external ulcer, the painful swelling of the arm, the fixed axillary mass and to a large extent the recurrences in the liver and the pelvis were things of the past. But at the end of three years one or two nodules appeared at the inner end of the upper intercostal spaces of the affected side, and at about the same time a hard gland made its appearance at the lower and inner angle of the posterior triangle just over the subclavian artery. From this time the patient, hitherto so well, went rapidly downhill and died within a few months with signs of a mass in the superior mediastinum, or with signs of pleural deposits on the side of the growth, or on both sides. The end was a comparatively merciful and rapid one, and the terminal period of invalidism was a short one, unaccompanied frequently by any agonizing pain, or by the distress of an offensive discharging ulcer. The patients died later, and they died more easily, but they died just the same, and I well remember the period of deep discouragement which attended by realization of this sombre fact. A study of the sites of recurrence provided the explanation, which can be stated in a very few words. At about the time when the axillary glands are infected cancer cells in a large number of cases obtain accesss also to the parasternal glands which lie within the chest along the course of the internal mammary artery. About seventy per cent. of cases of breast cancer present enlarged axillary glands when they first consult a surgeon. It will be seen then that in seventy per cent. of cases at the time it is submitted to treatment breast cancer is an intrathoracic disease.

It is now ten years since I realized this fact, which carried with it the conviction that operative treatment alone is inadequate to deal radically with breast cancer. It appeared to me then that a combination of operation to remove the external disease with buried radium tubes to reach its intrathoracic extensions was the method of choice, and even to-day I am not convinced that this conclusion is erroneous.

Since 1920 I have made a routine of this policy, and I believe that I can claim to have rationalized and standardized the use of radium as an indispensable adjuvant to operation for breast cancer.

At the time of the operation, before the wound is closed, a twelve-milligram tube of radium element, screened by 1 mm. of platinum, is introduced from the axilla and is pushed up internal to the vein above the first rib, so that it comes to lie just over the lowest of the supraclavicular glands. This gland, situated in the lower and inner angle of the posterior triangle just over the subclavian artery, is the first of the glands above the clavicle to be invaded by breast cancer. Similar tubes are then pushed into the intercostal muscles at the inner end of the first, second and third

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intercostal spaces. The ends of these tubes are lodged just beneath the edge of the sternum. The tubes are withdrawn in twenty-four hours by threads of fishing gut attached to them, left protruding at a convenient point, through the sutured incision. An anæsthetic is rarely necessary for the purpose of removing the tubes.

Since adopting this method I have very rarely seen recurrence at the inner end of the upper intercostal spaces or in the supraclavicular region—the sites of election for recurrence, according to my previous experience. Broadly speaking, and with very rare exceptions, the sites of implantation of the radium tubes are rendered immune to recurrence. But of late years I have on various occasions seen recurrence along the edge of the lower part of the sternum, and to avoid this in future tubes should be used in the fourth and fifth as well as in the first three spaces.

Only a moderate improvement in final results can be expected from the use of radium tubes along the parasternal chain of lymphatic glands. If the disease has already at the time of operation spread to other glands within the thorax, such as the aortic glands or those at the root of the lung, the fatal issue is already decided when operation is performed, although there may be no clinical indication of the fact.

In 1928, 56 of my private cases who were treated by operation with prophylactic radium had passed the three-year limit, and 46 of these cases could be followed up. Twenty-six of the cases traced remained free from recurrence three years after operation—a percentage of 56.5. The corresponding figure for an earlier series of private cases treated by operation alone was 47 per cent. These figures give a measure of the improvement due to the use of radium, but only a partial measure. It is reasonable to hope that the surviving radium cases will be found as the years go on to contain a greater proportion of actual cures than the earlier series dealt with by operation alone.

The routine use of radium to deal with the intrathoracic extensions of breast cancer—extensions which are frequent, clinically inappreciable, and found mainly along the parasternal chain of lymphatics—thus rests upon an unassailable basis of evidence. Recently my colleague, Mr. W. Turner Warwick, has advocated the still more extensive application of radium tubes to the operation field after removal of the breast. Since the disease may penetrate through the pectorals into the intercostals, and may then run along the intercostal lymphatics, this method seems to be advisable, at any rate in late cases, if sufficient radium is available, though it involves some risk of injury to the thin operation flaps.

At the present time the tendency in radium therapy is to follow the example of Regaud and to use weak tubes of radium for a long period, instead of strong tubes for a short period. A comparatively small amount of radium can thus be spread over a large area of tissue, and Mr. Warwick's technique takes advantage of this fact to irradiate after operative removal of the breast not only the whole length of the parasternal lymphatic chain, the epigastric and supraclavicular regions, but also to insert other radium tubes along the line of the intercostal lymphatics in the upper five spaces as far back as the point of emergence of the lateral cutaneous nerves. The tubes, numbering about thirty, and containing in aggregate nearly 100 mg. of element, are left in position for a week.

Mr. Warwick says:—

"The results obtained by Sampson Handley in his recent cases show an improvement on those of his previous series, which he suggests may be due to the addition to his technique of inserting radium in the supraclavicular fossa and in the anterior extremity of the intercostal spaces.

"The possible limits of the application of radium to the lymphatic spread have not yet been explored. Observations in the post-mortem room of advanced cases of cancer of the breast show that, where lymphatic spread has been slowly progressive, the upper intercostal spaces of the affected side, looked at from the pleural aspect, are frequently outlined by growth throughout their whole extent, and the supraclavicular region is infiltrated by it."

Mr. Warwick contends, and I think rightly, that only after a radical breast operation has been performed can radium be placed accurately between the intercostal muscles and in the desired situation in the axillary and supraclavicular spaces.

Within recent years Mr. Geoffrey Keynes, in Professor Gask's clinic at St. Bartholomew's Hospital, has made a notable attempt to displace operation altogether in the treatment of breast cancer, and to substitute for it an extensive and prolonged irradiation by buried radium tubes. The logic of the attempt cannot be denied. If radium can deal with the intrathoracic extensions of the disease, a conclusion for which I have produced definite evidence, the same agent should be equally able to destroy the primary growth and its extensions in the body-wall.

Logic, however, is a dangerous if fascinating weapon, and its temptation is to produce a clear-cut inference by ignoring essential factors in the problem under consideration. For this reason alone, apart from the difficulty of inadequate radium supplies, it will be necessary to wait the slow process of time before radium can be accepted as a substitute for operation. Whereas clinically a breast cancer appears to consist of a lump in the breast, and perhaps a lump in the axilla, the known facts about the spread of permeation show that the tumour is essentially a delicate and widespread reticulum of microscopically permeated lymphatics, the limit of which cannot be determined by any clinical methods of observation. The infected circle of deep fascia behind the breast may easily reach a diameter of six or eight inches in cases which by ordinary clinical standards are still operable. It may be inferred that a circle eight inches in diameter, 48 square inches in area, requires to be radiated. To this circle must be added the area of the axilla, say, nine square inches, making 57 square inches in all.

Over this large area a lethal dose of radiation must be carried down at least as far as the plane of the deep fascia, which, in an adipose breast, may be shielded by six inches of fatty tissue. A lethal dose must be carried also to the very apex of the axilla.

Mr. Keynes states that the tubes are so placed that "the whole of the carcinoma and a considerable area surrounding it will be evenly illuminated by the radiations." But the administration of a lethal and uniform dose of radiation over such a large area and volume of tissue is a difficult and uncertain matter, and has not the simplicity which Mr. Keynes assumes. The undertaking requires also a close and, if possible, a first-hand study of the process of dissemination, and I note that Mr. Keynes has recently modified his technique to meet the danger of parasternal invasion of the thorax which I had pointed out. I still think that he lays too little stress upon the proper centring of the radiated area upon the point of origin of the disease. Nor does he, in my opinion, as judged by his published skiagrams, practise the radiation of a sufficiently large circle to ensure the destruction of the microscopic growing edge of permeated lymphatics upon the deep fascia. It must be remembered that an inadequate dose of radiation may actually stimulate a carcinoma cell.

Mr. Keynes claims for his method that it seems to promise results comparable with or even better than those of operation, though, as he says, many years must elapse before a final opinion can be expressed. He claims "a good result in half the patients treated, although only 7 out of 26 could be regarded as operable." Within the next year or two a sufficient number of his cases should have reached a three-year limit to enable a *prima facie* conclusion to be reached.

I note that Keynes now advocates in certain cases a late operative removal of a residual tumour. If this proves to be necessary in any large proportion of cases, it seems doubtful whether the Keynes' method will replace, for cases still operable, diathermic operation

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for removal of the mass of the disease and for facilitating the accurate and selective radiation of the known paths of spread. Undoubtedly, for cases inoperable when first seen, the method of Keynes represents a great and beneficent advance.

For operable cases I think the method of Keynes, which has given me good early results, must be admitted to equal competition with ablational methods. When a patient asks me whether I advise operation or treatment by buried radium I usually offer her the choice, adding that if she has the investor's rather than the speculator's temperament she will choose operation combined with selective radiation. The last patient to whom I presented the choice at once replied: "I have been a gambler all my life, and I choose radium."

I would not, however, give such freedom of choice to all patients. Mr. Keynes has said nothing about the deleterious action of a massive dose of radium upon the heart. In patients advanced in years, and with myocardial degeneration or organic disease of the heart, a heavy dose of radium may cause irregular and rapid cardiac action, or pericarditis. A left-sided carcinoma in such a patient can be more safely treated by operation than by radium.

Diathermy in breast cancer.—It is perhaps not yet generally realized how great are the advantages which the diathermic needle presents over the scalpel in the removal of breast cancer, as indeed in many other fields of surgery. The method represents not a mere optional variation in technique, but a striking improvement. Its advantages depend mainly upon three peculiarities of diathermic cutting: (*a*) That it seals most of the small vessels as it cuts them and so minimizes loss of blood; (*b*) that it divides nerves almost without stimulating them and leaves their exposed ends insensitive; (*c*) that during the operation it supplies heat to the body generally and especially to those parts which are exposed for the purposes of the operation. The three principal causes of operative shock, namely, violent nerve impressions, loss of blood and loss of heat are thus minimized.

Indications for Treatment in Pulmonary Tuberculosis.

(*The Mitchell Lecture delivered before the Royal College of Physicians of London on 13th November.*)

By L. S. T. BURRELL, M.D. (Camb.).

(Reprinted from *The Lancet*, November 22nd, 1930, p. 1109.)

It is usually a simple matter to decide whether a patient has been infected with tuberculosis, but it is often extremely difficult to determine whether or not the lesion is active. Yet on this depends the need for treatment.

The problem commonly comes before the practical physician in one or two ways. In the first he is asked for an opinion as to whether a certain series of symptoms, such as lassitude, wasting, cough, in a patient previously healthy, is due to active tuberculosis. In the second he is asked whether a patient who admittedly has had pulmonary tuberculosis still has active disease requiring further treatment or whether it has become arrested.

Before discussing these questions it seems to me wise to consider briefly the current views on infectivity and immunity. On this subject there is a wide difference of opinion, and consequently there are different views not only as to the nature of treatment but also as to what type of patient requires any treatment at all, either for prevention or cure.

Infection and immunity.

Tuberculin may be of little value but it has at least brought out the fact that a large proportion of human beings is infected with tuberculosis. Yet only a few develop clinical tuberculosis. Since so many are infected and so few affected, it follows that the majority of people keep well without any treatment at all. To submit anyone to a long course of unnecessary treatment is not only useless but may do untold harm. Many a healthy person has been frightened into invalidism by the threat of tuberculosis. Instead of following a normal career, the patient gives up business and devotes his life to health. He develops fads about food and clothing, cannot live in this or that climate, must winter out of England, is in a constant state of anxiety about his health, and is never really happy. Bad as this is for an adult, it may be much worse for a child if taken away from school and companions of a like age at the most impressionable time of life. On the other hand, an active tuberculous lesion is very amenable to treatment in the early stages, but if neglected quickly gets out of control. It is, therefore, of the utmost importance to distinguish between the tuberculous and those who are out of sorts through some other cause. These latter require treatment, but it is usually a matter of adjusting the mode of life, or in the case of children of arranging diet. Doubtful cases should be watched at frequent intervals, but only after the fullest consideration should a patient be diagnosed as tuberculous and sent away for a long course of treatment. It must be remembered that if tuberculosis is lurking in the body, a prolonged sea voyage or holiday will not necessarily prevent the development of clinical pulmonary disease, and in many cases the patient would be better carrying on his usual occupation under medical supervision. Work is healthy, holidays sometimes are not.

Now in the prevention or treatment of early disease much depends on the view taken of immunity conferred by infection. If we believe that a small infection or series of infections protects the individual effectively, then the correct procedure is to treat those who fail to react to tuberculin either by exposing them to infection or inoculating them with tuberculin or an emulsion of attenuated tubercle bacilli. Some have actually protested against the pasteurisation of milk on the grounds that by repeated small infections through the milk the child gradually acquires immunity. The opposite view is that clinical disease cannot occur without infection, and the essence of prevention should be to abolish or dilute as far as possible all sources of infection, so that there may be as little chance as possible for infection or reinfection.

According to the first view it is those who fail to react to tuberculin who are in danger; they are the unvaccinated. According to the second view the reactors are not effectively protected and are in danger from activation of their own lesions as well as of a chance reinfection. These views should be carefully examined, since they vitally affect the policy of the campaign against tuberculosis, as well as our opinion of the indications for treatment in an individual case.

Resistance of the infected.

Now, if one takes a broad view, tuberculosis of the infant is quite different in type from that of the adult in most civilised communities. Amongst certain primitive races, or those who have not been brought into contact with tuberculosis, the adult does not acquire resistance, and if infected develops the infantile type of the disease—that is, an acute generalised tuberculosis which proves fatal in a few months or even weeks. A race may be completely free from tuberculosis until the white man comes and introduces it; then follows an acute form which may decimate the population. In their native state monkeys are free from tuberculosis, but in captivity it is a common cause of death. One diseased monkey will infect others in the same cage and the type of disease is that found in infants, acute and rapidly fatal. Experimentally it is known that if living tubercle bacilli are injected into an animal which has not previously been infected there is no immediate reaction and it remains quite well for a time but later, if the dose is sufficient, it becomes ill and dies of generalised tuberculosis. If tubercle bacilli are injected into an animal which has previously been infected there is an immediate reaction which may be fatal. If it survives, however, recovery may take place without

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any actual disease developing provided the infecting dose was not too great. If disease does occur it progresses much more slowly and is associated with attempts at healing, as indicated by the formation of fibrous tissue. Infection of a non-immune animal, therefore, produces an acute type of tuberculosis such as occurs in infants and people who have not previously been exposed to the disease. Infection of an immune animal produces an entirely different type of disease which is chronic and, although usually fatal in the end, is associated with serious attempts at healing which are at times successful. This is the type of disease commonly seen in adults in civilised countries.

It will be seen that there is definite experimental and clinical evidence to suggest that resistance develops from infection. Resistance, in the sense that the addict is resistant to morphia, does undoubtedly occur; but I suggest that this is different from resistance or immunity such as is produced by vaccination against small-pox.

It is true that the usual type of disease in the infant is acute and generalised, but in the great majority of cases the child resists the infection and fixes the disease, not in the lungs with resulting chronic fibroid disease, but in the glands. Unless miliary tuberculosis develops the disease seems to pass through the lungs of the infant without producing any lesion. Children are particularly free from pulmonary tuberculosis until they reach the age of puberty. Then the mortality rises. The rise occurs earlier in girls than in boys and in girls of 16 to 20 years of age the mortality from pulmonary tuberculosis is greater than that from tuberculosis from all causes in the infant. To explain this rapid rise in mortality by assuming that the specific resistance to tuberculosis is lowered by the strain of life that occurs about puberty seems to me to be very unconvincing. No such failure of resistance to other conditions such as measles occurs at that time. Moreover, if one makes a series of tuberculin tests one finds that a positive reaction occurs with increasing frequency from infancy to adult life. There is no falling-off in the number of reactors to tuberculin as puberty and the great increase in the incidence of tuberculosis occur. In the primitive races the incidence and type of the disease does not appear to be in any way dependent on whether they have been tuberculinised or not as shown by the reaction to tuberculin. Different races are affected differently, as in the case of animals; the sheep, for example, is immune but the cow is susceptible. Although half a century has passed since Koch discovered the tubercle bacillus, no recognised method of protection against tuberculosis has been evolved either by tuberculin or emulsion of living bacilli. The reported success of experiments with B C G still awaits confirmation. Griffiths failed to protect monkeys by B C G, and the abolition of tuberculosis as a serious menace to monkeys in captivity in many zoological gardens followed better ventilation, housing conditions, and light—and not the tuberculinisation of the animals.

If infection really protects, it is difficult to see why patients with a mild tuberculous lesion, such as pleural effusion or a small pulmonary lesion which has apparently healed, should be more liable to get a recrudescence of active disease than others. They are not only not protected against clinical tuberculosis but are rendered more liable to get it. Evolution by the survival of the fittest produces wonderful protective powers in the animal body, and a race which has to live in a country where tuberculosis or typhoid or yellow fever is endemic tends to become much more resistant to it than a race where the disease does not occur. The body also develops defensive powers against any poison gradually introduced and one would expect the chronic consumptive to have considerable resistance—as in fact he has. If he has no resistance he dies rapidly before he has time to become a chronic consumptive. True immunity such as occurs after small-pox, scarlet fever, etc., is surely an entirely different thing from the resistance which develops from habit in such cases as alcohol, arsenic, or, I venture to suggest, tuberculosis. It is not a question of relative immunity; the two are completely different. In one case the individual having had small-pox is immune and can live in an atmosphere of small-pox. In the other the effect of the poison is modified as the body becomes accustomed to it, but there is no real protection, and death from tuberculosis eventually occurs in the majority of cases.

INFECTION SHOULD BE PREVENTED.

For these reasons I am of opinion that failure to react to tuberculin is not an indication for treatment. An attempt to protect by tuberculin or tubercle bacilli seems to me to be wrong. Clinical tuberculosis develops from a tuberculous lesion. If there is no lesion it cannot develop. The policy that appeals to me is therefore to prevent infection, and if this is impossible, to dilute it as far as possible. In practice it is found that where this has been done by sanitation, cleanliness, and correcting overcrowding, there tuberculosis has decreased. There is no evidence that any success has followed attempts to diminish the incidence of the disease by producing immunity. There is evidence that in certain cases where attenuated tubercle bacilli have been injected to produce immunity clinical and fatal tuberculosis supervened.

THE SUSPECTED EARLY CASE.

If the patient reacts to tuberculin it may be assumed that he has been infected. The problem then is to decide whether the symptoms are the result of a tuberculous lesion or whether the lesion is not active and the symptoms are due to some other cause. In the first case, treatment should be directed against the tuberculosis; in the latter the tuberculous lesion, as indicated by the tuberculin test, is accidental and requires no treatment. I shall now consider a number of symptoms which are associated with tuberculosis of the lungs.

SYMPTOMS.

Cough is so commonly present that its absence must be taken as evidence against the diagnosis of pulmonary tuberculosis. In some cases of acute miliary tuberculosis, however, there is no cough. Paroxysmal morning cough accompanied with vomiting is not uncommon in the later but not in the early stages of the disease. It is more frequent in alcoholics with bronchitis. People who smoke too many cigarettes usually have some cough. Cough which suddenly develops and lasts more than a month is suggestive, and of 611 patients admitted to Brompton Hospital with pulmonary tuberculosis it was the first symptom noticed in 44.8 per cent.

Sputum is often absent in the early stages and when it appears it is mostly mucus, and tubercle bacilli are not found. A negative sputum test in the early stage is of little value, but when once the sputum has become purulent failure to find tubercle bacilli is very strong evidence indeed against the disease being active tuberculosis. Kingston Fowler reports 188 cases from Midhurst Sanatorium and in these tubercle bacilli were found in the sputum on the first examination in 167 and on the second in 12 cases. That is to say, that in only 9 out of 188 cases were they not found at the first or second examination.

Fever.—In early active disease there is usually some rise of temperature in the evening. The typical tuberculous temperature is an exaggeration of the normal curve, highest in the evening and lowest in the morning. If the temperature is taken at 6 p.m. and 8 a.m. it will bring out the highest and lowest reading. In tuberculosis, however, it is increased by exercise, so that when investigating a case the temperature should be taken immediately after exercise and subsequently at intervals of 15 minutes in order to note the time it takes to fall. A slight evening rise of temperature alone is not enough for a positive diagnosis to be made. It is common in children with digestive trouble, in toxæmia from other causes, and in women before menstruation.

Night sweats are common in the early stages of the disease but usually disappear when the patient is put

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to bed and does not have too many bed-clothes. They are not common in hospital cases. Patients who wake up at night feeling hot will often complain of night sweats, but this is not important. True night sweats as a result of which the night clothes have to be changed are very suggestive of tuberculosis in an acute stage. In a chronic case they indicate an acute exacerbation and are of serious omen.

Debility.—Loss of energy is present in the great majority of cases and it was the first symptom noticed in 9.5 per cent. of 611 cases at Brompton Hospital. It is almost invariably associated with some localising symptom such as cough.

Loss of weight.—In the very early stages loss of weight is often slight. It was the first symptom in only 2.3 per cent. of the 611 Brompton Hospital cases. Persistent loss of weight for no apparent cause is far more likely to be due to some other condition.

Loss of voice is an occasional early symptom and should arouse suspicion if associated with other symptoms. Persistent loss of voice should always lead to a thorough investigation of the chest, including examination with *x*-rays. If tuberculous laryngitis is found it should be assumed that the lungs are also infected.

Dyspnœa.—Shortness of breath is not common in the early stages, except in tuberculous broncho-pneumonia, when it is extreme.

Dyspepsia.—Digestive troubles are occasionally the first symptoms noticed by the patient, but they are usually associated with some more obvious complaint, such as cough.

Hæmoptysis may occur as a result of mitral stenosis, bronchiectasis, fibroma of bronchus, malignant disease, or other causes, and a thorough examination should be made. If, however, no other cause can be found it should always be taken to indicate tuberculosis of the lungs. Large veins may be seen at the back of the throat, but they never cause hæmoptysis. It does not follow that hæmoptysis in tuberculosis is necessarily an indication for treatment of the tuberculosis. It is common in chronic fibroid cases and often no treatment is required except during the actual hæmorrhage. In the great majority of cases, however, especially those who were previously supposed to be healthy, hæmoptysis does indicate active disease requiring treatment.

Pleurisy.—Idiopathic pleurisy is almost invariably tuberculous. It occurs in many local conditions, such as neoplasm, bronchiectasis, or abscess of lung, and it is always present in pneumonia. In chronic wasting diseases there is often pleurisy, and pleural effusion is common in cases of renal disease or heart failure. If, however, it occurs in the apparently healthy as a result of a chill, or sitting in a draught, or for no obvious reason, it should be regarded as of tuberculous origin. If an effusion forms and clear fluid containing an excess of lymphocytes is found a definite diagnosis should be made. It should be borne in mind that pleural effusion develops as a result of tuberculosis of the lungs. We know, therefore, that the lungs are already affected. With treatment, or in some cases without treatment, the pulmonary lesion may heal, but in some 40 per cent. of the cases it goes on to a definite form of clinical pulmonary tuberculosis which can be detected by physical signs and symptoms.

Physical signs.

In some schools nowadays it is the custom to belittle the value of physical signs. Let us try to estimate their value fairly. In the first place it must be admitted that one often sees a patient who has been examined by several experienced physicians, but in whom no physical signs are found, yet in whose lungs there is tuberculosis as indicated by the presence of tubercle bacilli in the sputum, the evidence of *x*-rays, and the subsequent development of physical signs. It is evident, therefore, that it is quite unjustifiable to say that a patient has not got tuberculosis of the lungs because he has been examined by one or even several physicians with special experience of chest work, and no physical signs have been detected. Again, physical signs are often misleading. A little dullness at one apex may be due to scoliosis, old pleurisy, or muscular development; it cannot reasonably be taken as an indication of early tuberculous disease of the lung. By the time any impairment of the percussion note is obtained, the disease has progressed far beyond the stage in which it should have been detected by symptoms or radiographic examination. It does happen sometimes, though very rarely, that on examination of an apparently healthy person definite signs are found. In this case there is usually good resistance and fibrosis is taking place. None the less, because it does occasionally reveal the presence of unsuspected disease, physical examination of so-called contacts is important. The point I wish to emphasise is that if no physical signs are found, it is no evidence whatever that the patient is free from tuberculosis. On the other hand, physical signs are important, not only because they are very occasionally the first indication of disease but because they frequently enable one to judge the spread of it. Of all physical signs the only one that is really important is the presence of moist sounds over the upper part of the lung; if these sounds are constant and increase with cough they are almost pathognomonic of tuberculosis. Other signs, such as slight flattening at one apex, impairment of percussion note, altered vocal fremitus, are not only useless in the majority of cases, but they may be actually misleading and dangerous. One is often presented with a case of hæmoptysis and sputum containing tubercle bacilli in which one finds slight impairment of note at the left apex, with diminution of movement and weakened breath sounds; and yet *x*-rays show the left apex to be clear, whereas there is a definite lesion at the right root and the subsequent course of the disease brings out physical signs at the right root whilst the left apex remains perfectly free. I say, therefore, examine your patient carefully but put not your faith in physical signs.

Examination with x-rays.

The correct interpretation of radiographic findings is a matter of great difficulty, and it is always wise to have the collaboration of an experienced radiologist. Fine mottling of the lung, especially if seen below and just external to the midline of the clavicle, is strong evidence in favour of tuberculosis. If there is doubt a series of *x*-ray examinations at intervals of three months should be made, and any increase in the shadows will confirm the suspicion and enable one to make a diagnosis. Shadows round the root of the lung, even if dense and exaggerated, should not lead one to a diagnosis of tuberculosis. The hilum of the lung is made up of blood and lymph vessels, bronchial tubes, and glands, and often a dense *x*-ray shadow is seen in a patient who is found at post-mrotem to be free of any disease in that region. Tuberculosis starts in the lung and spreads from there; it does not start in the glands at the root and spread into the lung.

SPECIAL TESTS.

There are many special tests but none is of value except in a negative sense. I have already referred to the tuberculin test, and I shall say no more except that a negative test is evidence that the patient is not infected with tuberculosis, except under certain conditions. If the patient is moribund or seriously ill with tuberculosis the test may be negative. In two adults with typhoid fever I found the tuberculin test negative, and other illnesses have the same effect, but in a doubtful case of tuberculosis a negative tuberculin test is an indication that the patient is free from that disease. The test, however, is of little practical value, because in a civilized country the great majority of people give a positive reaction, whether or not they have or will subsequently develop clinical tuberculosis.

The opsonic index and complement-fixation tests have been tried extensively but have been found wanting and consequently have been discarded by most workers. The sedimentation test is of little value for diagnosis, although very useful as a help to the progress

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of the disease and to assist in treatment. For example, after the induction of an artificial pneumothorax, if the toxæmia is relieved, the sedimentation rate will fall and one is helped in judging the result of treatment by this test. A quick sedimentation rate occurs in other diseases besides tuberculosis, and in an early case of tuberculosis before toxæmia has developed the sedimentation rate may be normal.

The same applies to vital capacity, except that a normal vital capacity is very rare in pulmonary tuberculosis even in the early stages. It is useful for following the progress of the disease and for assisting in treatment, but it is lowered by many other diseases besides tuberculosis, and is of little value in diagnosis.

INDICATIONS FOR TREATMENT.

In the absence of definite evidence that the symptoms are due to tuberculosis, the patient should be kept under observation and not treated as a consumptive. If there is definite evidence, thorough treatment should be started at once. The slighter the amount of disease the more urgent is the need for treatment, because the patient then has a chance, and with proper care, a very good chance of complete recovery. There is a world of difference between being well and being patched up. A patient will often say he is not bad enough to go into a sanatorium, but the physician should remember that this is a fallacy and that the main function of a sanatorium is to restore to complete health those who have not yet passed into the incurable stage of the disease.

It is therefore of the utmost importance to decide whether a patient is suffering from tuberculosis which is progressing and in need of treatment, or whether the symptoms are due to some other cause, and tuberculosis, if present, is already healed. To sum up my remarks about physical signs and symptoms:—

1. Hæmoptysis of unknown origin should be taken to indicate pulmonary tuberculosis.
2. Pleural effusion is the result and not the cause of pulmonary tuberculosis, unless it is due to some other definite condition such as neoplasm or heart failure. After recovery from the effusion the patient should always be treated as an early and active case of tuberculosis of lung.
3. *X*-rays are by far the most important method of examination and a definite diagnosis can often be made by this means alone. It is however essential to interpret the radiographic findings correctly and to avoid the many errors, the most common of which is to mistake heavy root shadows for disease of the lung.
4. Physical signs are misleading, but the presence of constant moist sounds over the upper part of the chest may for all practical purposes be taken as definite evidence of tuberculosis.
5. The presence of tubercle bacilli in the sputum is conclusive.

Of the signs and symptoms no one is sufficient for a diagnosis to be made, but in combination they may lead to a suspicion so strong that a positive diagnosis is justified. For example, a patient develops a cough which persists for a few months, he also feels easily tired and slack, and is found to have a slight rise of evening temperature, and this rise is exaggerated by exercise. Even if the *x*-rays show what appears to be normal lungs and there are no physical signs such a patient should be put to bed and treated as a case of early but active tuberculosis.

THE CHRONIC CASE.

So far I have reviewed the indications for treatment in patients who are probably infected with tuberculosis but who have never had the disease as it is known clinically. I shall now consider the indications for treatment in the chronic fibroid type of case.

In all active cases when there is fever or signs of spreading disease the need for treatment is obvious. When fibrosis has occurred the patient wants to return to his usual occupation and recreations and wishes to know what treatment, if any, is required to prevent a relapse. It should be remembered that there is always need for treatment in the sense that the patient should lead a quiet, regular life, avoiding excess of all kinds. Strain and excess tend to shorten the life of anyone, but in the case of the consumptive there is the additional danger that they will cause a relapse of the disability. Sedentary work in an office is better than a strenuous life in the open air. Fresh air is good for everyone, including the consumptive, and it is especially desirable in his case because if he gets below par he is more liable to a serious breakdown than is the ordinary man. Unnecessary exposure to cold may do harm, especially to the elderly. Let us say therefore that for the fibroid-arrested case there is always need for treatment, but the only treatment required is for the patient to lead a wise, restful life. Apart from this treatment is required only if the disease again becomes active. The indications of reactivity are the appearance of certain symptoms and physical signs.

Loss of weight.—During sanatorium life patients are apt to put on too much fat and they usually lose some of this when they return to their occupation. This is not important, but a steady loss of weight below the normal is an indication for treatment.

Loss of energy.—If the patient feels overtired after his day's work, and especially if the tiredness increases, treatment is necessary.

Evening rise of temperature suggests that there is some active disease, but other causes of pyrexia should be investigated.

Return of cough and sputum indicate the necessity for treatment, at least until they have disappeared again.

Hæmoptysis should be treated, but it does occur repeatedly in some chronic cases without doing any apparent harm and they can continue at work between the attacks.

Pleurisy is not infrequent, but here again the patient is often well after the attacks and does not require prolonged treatment.

The patient should be examined periodically, and an increase in the physical signs, and especially an increase in the lesion as seen by *x*-rays, shows that the disease is spreading and treatment is required. Finally, it should be remembered that an idle life is not a healthy one and that many a patient will live longer if he thinks less of his own health and settles down to some suitable occupation.

Ulcerative Colitis: Its Treatment by Ionization.

By JULIUS BURNFORD.

(Abstracted from *The British Medical Journal*, October 18th, 1930, p. 640.)

WITH a view to estimating the value of ionization as a treatment for colitis an analytical summary was prepared of a consecutive series of cases dealt with in this way. In some, ionization was the sole treatment; in others, it was tried after various other methods had failed. In two cases emetine was given at the same time by impatient observers, although it was extremely doubtful that the patients could have been infected with amœbic dysentery.

In all there were twenty-one cures. Six patients relapsed, and four were again treated with satisfactory results; the other two, who did not carry out the instructions, failed to get relief at other hospitals. Two failures are still alive, but one of these ascribes the improvement in his general health and increase in weight (2 st. 11 lb.) to the ionization. Another who refused the treatment had a colectomy performed. Three patients were too ill to stand the treatment. One case of spontaneous cure without any special treatment is of importance in assessing the value of treatment.

Duration of symptoms.

Appendicostomy with subsequent lavage—the treatment recommended by most surgeons—had been tried in some cases. Colon lavage with various saline and

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astringent solutions had failed in others. In some anti-dysenteric serum had been used, but without the striking results reported by some observers.

Technique.

In the earlier cases daily lavage was employed, but patients at times became intolerant of this, and rendered the ionization difficult. There is no sound argument for sluicing the bowel contents. It can neither rest the gut nor disinfect it, for within a very short time of washing out the colon the contents become foul again. In the later cases, therefore, the daily lavage was omitted, and castor oil was administered twenty-four hours before each ionization.

A special flushing electrode was used. This was made for me by the Medical Supply Association. The ionization is carried out while the zinc solution is passing in. At first 2 per cent. solution was used, but latterly only 1/2 per cent. in quantity up to the limit of tolerance. At first only a little may be tolerated with 2 or 3 ma. of current, but finally three pints may be held whilst a current of 20 ma. is passing for fifteen minutes or longer.

The dietetic factor is important in view of the nutritional disturbance. It is not possible to alter the consistence of the contents of the colon to any extent by varying the food given by the mouth. The solid residue from a purely milk diet cannot be less irritant to a diseased colon than that resulting from a light diet, more varied, more palatable, and certainly more nutritious to an adult. Hence a liberal light diet was always allowed.

Several manifested a hypochlorhydria, and some achlorhydria. In these hydrochloric acid in doses of half a drachm was given, together with glycerin of papain.

Cure is judged by the presence of normal stools containing no pus, and to a lesser degree—as only a part of the bowel falls within the field of vision—sigmoidoscopic evidence.

Relapses.

Relapses are liable to occur in all cases of ulcerative colitis; in my series there have been several. These, however, have been of a mild nature, and have readily responded to treatment where the patient returned for advice early. In each of these the relapse was caused by indiscretion of diet or a return of constipation. Apart from those shown in the table, no other relapses have occurred up to the present time.

An important point is the secondary anæmia which often supervenes. This is at times resistant to treatment. One patient has returned to hospital for a blood transfusion, which, I think, could have been done with advantage much sooner. This patient was actually sent to hospital as suffering from chlorosis, with a hæmoglobin content of 21 per cent.; colitis was diagnosed only after admission.

In conclusion, it would seem from the evidence here adduced that in ionization we have a distinct advance on previous methods for treating ulcerative colitis.

The Treatment of Septic Surfaces by Zinc Ionization.

By A. R. FRIEL, M.D. (Dub.), F.R.C.S.I.

(Abstracted from *The British Journal of Actinotherapy and Physiotherapy*, November, 1930, p. 167.)

THE object of this short paper is to state the principles of the treatment of septic surfaces in the body by zinc ionization, and to illustrate these by their application to one particular instance, namely, chronic otorrhœa. Acute inflammation in which irritation exists within the tissues rather than on their external surface is not usually suitable for treatment by zinc ionization.

It will be noticed that the word "surface" is emphasized. Discharge lying in contact with moist surfaces is liable to be contaminated with saprophytes. These decompose the discharge, which becomes irritating. The surface is also irritated by the secretions of the micro-organisms themselves. If we can make the fluid on the surface a poor culture medium for the germs, irritation from both sources will disappear, and increased secretion of mucus, or of serum and leucocytes, will cease. Healing will rapidly follow.

The zinc ion introduced is not a specific bactericide like an antibody. It is what is spoken of as a "general antiseptic," like carbolic acid, or, for that matter, the physical agent heat.

When we are confronted with any septic area (such as an open ulcer, a suppurating tract, or a suppurating cavity) we must make up our minds what is preventing the area from healing. We ask ourselves: Is it sepsis alone; or is there some other factor present in addition to sepsis, such as a piece of dead bone, or is there a foreign body, or a polypus, in areas in which these growths are liable to occur? Any such additional factors require to be removed, otherwise treatment by zinc ionization would be at most of only temporary benefit.

The next question is whether the area of sepsis is accessible in its whole extent. It would not be likely to be of much use to apply an antiseptic to half the area if we allowed the other half to remain septic.

If we are able to answer these two questions satisfactorily our next problem is simpler. It is one of technique. Can we apply the zinc solution to the whole area, and keep it in contact with that area during the time the current is on; and can we distribute the current in adequate amount to the whole area? Finally we have to consider how we are to determine what is an adequate dose, and how we are to prevent re-infection while healing is taking place.

In carrying out the treatment there are one or two points to be taken into account. When we apply a solution of a salt to a raw surface with a view to using zinc ionization, we should use the solution weak. We do not want it to smart. Smarting is an indication of irritation, and if we irritate we are likely to cause increased secretion. Secondly, we should not use it so weak that it would injure by osmosis the cells on the surface. We can attain our objects by using the zinc solution quite weak, such as a quarter of one per cent. and then make the solution isotonic by the addition of a little glycerine, which does not dissociate into ions.

In treatment by ionization we *substitute* ions for those in the tissues: in treatment by diffusion with hypertonic solution we *add* ions to the tissues with the result that the normal percentage of salts in the tissues is increased. In ionization the therapeutic ion *alone* is introduced at the place we wish to treat, while a corresponding negative or positive ion is introduced over a larger area at some other part of the body. At this latter area we introduce an ion, e.g., the chloride, normally present in the tissues.

At the surface of the metal which conducts the current to the ionizing fluids, secondary reactions with production of injurious chemical ions are liable to occur, such as the alkaline (OH) or the acid ion (H). We keep this OH ion away from the surface of the skin by placing a thick pad between the negative electrode and the skin, and in the case of the septic area we propose to treat, by adopting the same means or by making the electrode of zinc, so that the caustic H ion is not formed.

We determine the dose by first "trying" in a few cases what we think likely to be suitable, then varying the dose per unit of area until we find what is suitable, remembering that it is the *surface* we wish to treat. We note whether this surface is covered with epithelium or with granulations. If the former, a moderate dose must not be exceeded. (An excessive dose would destroy mucous membrane or skin and result in a scar.) In the case of granulations covering the surface there is not the same objection to a large dose, as these can often be destroyed without harm. We prevent re-infection by rendering the parts

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adjacent to a raw area sterile by painting with some antiseptic and by covering the suppurating area after it has been ionized with an absorbent sterile dressing.

To illustrate what has been said, we may take the case of an ear which has been discharging for some months. (1) We notice the amount and nature of the discharge and whether it is fœtid. Fœtor means that putrefactive bacteria are present, and usually indicates that there is an overflowing well communicating with the ear. Such a well can be the mastoid antrum. Putrefactive bacteria usually thrive without free oxygen. Of course, if discharge lies for a considerable time in the meatus or tympanum it is liable to become fœtid. (2) We then cleanse the ear by syringing or swabbing, or both, so that we can examine it. It is necessary to give care to the cleansing, otherwise we may miss some important point such as a perforation in the attic. Swabbing the surface of the drum and of the middle ear if we can with a little cocaine is a considerable help in our efforts to get it perfectly clean. When the discharge is cheesy and adherent to the tissues a swab dipped in ether will greatly expedite matters. (3) Then what is visible is to be noted and an effort made to discover if there is anything else of importance. Suction is applied with a Siegel's speculum and watch is kept to see whether pus, mucus, or cheesy material appears from "round the corner." (4) We examine the nose and throat to see if the ear is liable to become infected from sepsis in the nasopharynx extending up the Eustachian tube, or to be flooded with mucus from the same source.

We are now in a position to make a diagnosis of the "cause of chronicity." It will fall under one of the following heads, and the appropriate treatment is almost self evident.

Cause of Chronicity.	*Treatment.*
1. Accessible sepsis: e.g., most cases of tympanic sepsis.	Zinc ionization with or without boracic powder insufflation. In slight cases it is not necessary to ionize. Boracic powder alone is sufficient.
2. Accessible sepsis with second factor in ear: e.g., polypus.	Remove second factor, then ionize ear.
3. Accessible sepsis with inflammation in a neighbouring organ: e.g., rhinitis.	Treat neighbouring organ and ionize ear.
4. Inaccessible sepsis:	
a. Accessible with difficulty: e.g., cell in mastoid opening directly into tympanum.	*a.* Use special instruments to gain access: (*i*) Attic cannula: (*ii*) Gelatin-covered wire.
b. Totally inaccessible: e.g., most cases of attic disease, and of chronic mastoiditis.	*b.* Make area of sepsis accessible: e.g., destroy outer attic wall, ossiculectomy, partial or complete mastoid operation, and then ionize.

The clinical characteristic of treatment by zinc ionization is its efficiency, as judged by the rapidity with which cessation of suppuration is brought about.

The writer has come to believe that the success of zinc ionization as a method of treatment is due to two things.

First, that substances such as serum impregnated with zinc ions are bad culture media; and second, that, by this method of treatment, tissues underlying the surface treated are not irritated and do not pour out more mucus, serum, or leucocytes to form fresh media for bacteria.

Pruritus Ani et Vulvæ.

By L. F. R. KNUTHSEN, O.B.E., M.D. (Edin.),
and
F. H. HUMPHRIS, M.D. (Brux.), F.R.C.P. (Edin.), D.M.R.E. (Cantab.).

(Abstracted from *The Lancet*, September 13th, 1930, p. 569.)

TREATMENT.

THE successful treatment of pruritus taxes therapeutic ingenuity, and the reason for so many failures, partial or total, is that the attention to detail—without which success is often impossible—proves tedious both to patient and physician alike. But most patients will willingly submit to prolonged temporary inconvenience when accompanied with improvement, however slow, rather than have recourse to surgical interference—Ball's operation being the recognised operation.

Consider the local complications which it may be necessary to treat. Among these are chronic constipation, hæmorrhoids, ulcers, enlarged prostate, discharges (including irritant urine or fæces or even leakage of petroleum), caruncles, persistent Pacinnian bodies, hypertrophied anal papillæ, and any co-existent skin diseases, such as eczema. Of course, attention must be paid to the general health of the patient. It is sometimes found that in his diet there is something, perhaps a favourite food, towards which he is showing an evil idiosyncrasy. Moderation in alcohol and tobacco will be found beneficial. Especially, every effort should be made to restore sleep when insomnia is present. Luminal is useful, and it should be remembered that opium and its derivatives often not only fail to give relief but actually aggravate the irritation. Direct treatment falls under the two groups comprised in physiotherapy.

The small cracks which are of so frequent occurrence may be treated by means of ultra-violet radiation and *x*-rays, but they may also be healed by painting them with friars' balsam or touching them lightly with a stick of silver nitrate. The treatment *must* persist until the most careful examination fails to reveal any trace of erosion. Those which are associated with pruritus of mycotic origin are more amenable to collosol iodine oil or tr. iodi (half strength), or mitigal, an organic sulphur preparation (Schottmuller), or some such prescription as Deek's ointment half strength.

The formula for Deek's ointment is:—

℞	Salicylic acid	4 parts
	Bismuth subnitrate	10 „
	Mercury salicylate	4 „
	Oil of eucalyptus	4 „
	Vaselin and lanolin equal parts up to	100 „

As a general cooling lotion, and to ease the erythema after ultra-violet radiation (when erythema ought to be produced), a calamine and zinc oxide lotion is invaluable, and may be dabbed on the affected area two or three times daily. The need must be impressed upon every patient of thorough washing after each defæcation with some soap such as the germicidal soap of Parke, Davis, or Crooke's Collosol argentum soap. After this the parts should be gently dried with salicylic acid wool and calamine lotion applied.

Should any cracks or excoriations persist—and they often will, so that patience and perseverance are requisite—then the use of an ointment such as the following is recommended:—

℞	Hyd. subchloridi	2 drachms
	Bismuth subnitratis	1½ drachms
	Tr. aconiti	8 minims
	Glycerini	2 drachms
	Unguenti sambuci	up to 1 oz.

to be used night and morning.

When a paroxysm of irritation is threatened, a 2 per cent. carbolic lotion with spirit and rosewater will often abort an attack. The lotion should be kept at the bedside. Pinching the irritable parts does much less harm than scratching, and affords equal relief; patients

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will soon learn the importance of this suggestion. Should the parts get sodden with the characteristic unpleasant smell, dry calomel powder will prove serviceable.

Coming alike under general dietetic and special treatment, the value must be remembered of recourse to spas like Harrogate, Luchon, Aix-les-Bains, Schinznach, and many others. Here special apparatus directs a fine rose spray of warm sulphur water, once daily, for five or ten minutes locally against the irritable and often excoriated anal region, affording very great relief. The ordinary routine spa treatment will certainly also be of benefit. In cases of pruritus where the cause is believed to be bacterial, vaccine treatment must be borne in mind. An autogenous vaccine may be prepared from a culture made from scrapings taken from the affected anal area. For the details and dosage of this one must be guided by the bacteriologist.

The Diagnosis and Treatment of Some Common Minor Digestive Disorders.

By T. C. HUNT, B.M. (Oxf.), M.R.C.P. (Lond.).

(Abstracted from *The Lancet*, November 8th, 1930, p. 1001.)

CHILL ON THE LIVER.

ATTACKS occur at intervals, sometimes quite regularly, with no relation to dietetic errors and without apparent cause; occasionally they seem to follow chill or some mental excitement or emotion. They most commonly begin in early adult life, although an onset later is by no means rare. There is frequently a day or two's preliminary depression, irritability, or lethargy, which is followed by abdominal discomfort or actual pain, and succeeded by vomiting of bile or bile-stained material. Giddiness is a frequent accompanying symptom. There is no pyrexia, but often a very marked mental state of misery and depression, which is very different from the frightened shocked attitude seen in serious surgical conditions of the abdomen. The discomfort or pain is usually situated more in the right hypochondrium and epigastrium, but is not associated with any resistance or rigidity in this area; there may, however, be definite tenderness along the liver edge.

This type of attack is generally recognised as a "chill on the liver"—and this is indeed far from a bad description. It is certain that many such cases in fact occur with hepatic disorder and with gall-stones or cholecystitis.

Somewhat similar attacks may, however, be produced by other causes. There should be little difficulty in distinguishing such conditions as acute appendicitis, but besides migraine and cholecystitis—which I shall refer to again shortly—there are two common conditions which should be considered. The first is so-called gastric or abdominal influenza, the second is acute food poisoning.

Gastric influenza is one of those indefinite conditions whose very existence is denied by many. I am sure that such a condition does, in fact, exist, and in its diagnosis I would stress the following points: Firstly, it is primarily a general disease and only secondarily an abdominal one—that is to say, the first symptoms are general: headache, malaise, muscular pains, after which digestive symptoms begin. Secondly, it is rarely or never purely abdominal, and is almost always associated with throat or respiratory symptoms of some degree. These may be in the form of a tonsillitis or just a common cold, occasionally associated with a facial or labial herpes. There is moderate pyrexia, general aching and discomfort in the epigastrium, slight vomiting, marked anorexia, and great depression. Very rarely there is severe pain, due to spasm of the colon, which may closely simulate acute appendicitis; in "abdominal influenza," however, there is no true rigidity, and little real deep tenderness. A blood count is of the greatest value, as a leucopænia is typical of influenza, whilst appendicitis is associated with a leucocytosis. It is possible that the cause of the pain lies in the muscular coats of the intestine, analogous to the aching pains that occur in the voluntary muscles of the back and limbs. In treatment, the combination of rhubarb and soda is the most efficacious of all dyspeptic mixture, and aspirin, as a rule, is also useful and quite well borne.

Acute food poisoning, on the other hand, most usually begins as a purely abdominal condition, on which general symptoms supervene. It is almost always associated with diarrhœa, and there is more vomiting: the patient is more collapsed and the pain more severe and colicky. The whole colon may be very tender, but any rigidity over it is generally fairly easily overcome by gentle coaxing. The clinical features, therefore, especially distinguishing abdominal influenza, are the onset as a general disease, the associated tonsillar or respiratory symptoms, and the marked anorexia and mental depression. We should always hesitate to diagnose it if the symptoms are exclusively abdominal.

In the differential diagnosis between abdominal migraine and *gall-stones* and *cholecystitis* there may be considerable difficulty. In all cases it is essential to consider whether the primary factor may not be a migrainous, constitutional, or hepatic one rather than a purely local one of the gall-bladder itself. I have been especially interested in this subject since seeing a number of patients who have suffered from such attacks and have, in fact, had their gall-bladders removed for actual gall-stones or cholecystitis. There are not a few such patients in whom the attacks continue almost unaltered after the operation; many of them seem to be lost sight of, and some are diagnosed as "post-operative neurasthenia." An interesting group was analysed lately by McClure and Huntsinger who found that of 72 cases of "abdominal migraine" 45 per cent. gave evidence, by *x*-ray or otherwise, of chronic gall-bladder diseases; but of six such patients whose gall-bladders were removed for true organic disease not one was improved by the operation. In 90 per cent. of these 72 patients some evidence of disturbance of liver function was demonstrable, and I have myself, in a number of cases, found similar evidence. Thus I have quite recently seen 12 patients after cholecystectomy (for definite organic gall-bladder disease) who have continued to suffer from some dyspepsia and from periodic bilious attacks resembling "abdominal migraine." Mr. A. J. Cokkinis kindly allowed me to look up an unselected number of cases followed up by him after cholecystectomy and almost exactly one-third of these patients still complained of dyspeptic symptoms. I feel confident, therefore, that the condition of liver function is a most important factor in determining the symptoms associated with gall-bladder disease. It is, perhaps, no less important to diagnose between attacks of "abdominal migraine" and gall-bladder disease than to decide, if possible, which of the two may be the primary condition. Attacks since childhood or early adult life are against gall-stones being at least the sole cause of the condition. In true cholecystitis there are certain distinguishing features, notably a more or less localised tenderness over the gall-bladder area at the eighth and ninth right costal cartilages; pain is often worse on deep inspiration, and on percussion posteriorly the diaphragm may be found to move less than normally. Sometimes there is definite pain on pressure over the right phrenic nerve between the heads of the sterno-mastoid, which pain may travel to the abdomen and the right shoulder. The cyclical nature of the attacks is not necessarily against organic gall-bladder disease; the patients are, however, less well after the attacks than are migraine subjects, and are liable to flatulence and mild dyspepsia in their free intervals. The flatulence is like that of the "neuropath" and is often made worse by lying down, so that a post-prandial rest may actually disagree with the patient with gall-bladder disease. An *x*-ray is of great assistance, and the results of cholecystography after oral administration of tetra-bromphenolphthalein have greatly improved in recent months. Biliary drainage may also be of value. In the diagnosis, however, a careful history is of vital importance. In spite of everything there will still be

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THE

GERMICIDAL ACTION OF DIMOL

INTESTINAL ANTISEPTIC

Extract from Report by independent Bacteriologist appointed by "The Lancet."
(Full Report can be read in "The Lancet," 22nd February, 1930, p. 414.)

1. Determination of the Rideal-Walker coefficient of Dimol using organisms isolated from the fæces. (*See* Table I.)
2. Determination of the degree of dilution of the antiseptic leading to death of organisms in 15 mins. (*See* Table II.)

TEST ORGANISM.	TABLE I.—R-W coefficient (number of times Dimol more powerful than pure phenol).	TABLE II.—Degree of dilution leading to death of organisms in 15 mins.
B. typhosus	37	1:6500
B. dysenteriae (Shiga)	34	1:6250
B. dysenteriae (Flexner)	34	1:6000
Streptococcus faecalis	24	1:5500
" pyogenes	27	1:6000
" haemolyticus	28	1:6000
Pneumococci	32	1:7000
B. faecalis alkaligenes	30	1:6000
B. coli	30	1:5000

3. *Examination for toxicity.*—Single doses up to 0·02 g. (equivalent to 1/3 gr.) per kilogramme body-weight were given to rabbits without producing toxic effects. Such a dose corresponds to grs. 20 for a man weighing 10 stone, five times the dose advocated for therapy. No evidence of absorption as shown by carboluria was obtained. Repeated doses equivalent to two and a half times those recommended in therapy also failed to produce ill-effects when given three times daily over a period of four weeks.

CONCLUSIONS

1. Dimol intestinal antiseptic is found to possess a very high Rideal-Walker coefficient against the commoner organisms infecting the intestine.
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3. The preparation shows no evidence of producing toxic effects in animals even when given in very large doses. No carboluria was produced.

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many cases in which the attacks appear to be hepatic in origin and in which evidence of gall-bladder disease is inconclusive, others in which the attacks cannot be attributed solely to the presence of gall-stones, and some in which they have persisted unchanged after removal of the gall-bladder. There is a large bulk of evidence pointing to an association of hepatitis with gall-bladder disease (Graham, Flint), and I would urge that consideration should be given to the initial cause of liver dysfunction. This may, I believe, be in some cases migrainous or constitutional, in some bacterial. Of the "migraine" constitution we know all too little; the old writers spoke of it as "gouty" and the term uric acid headache was used, though Watson regarded such cases "with jealousy and apprehension." There are no constant stigmata that will enable us to detect such a constitution, which is, of course, typically familiar. Bacterial causes are certainly no less important. Subacute hepatitis may arise from the absorption of toxins or bacteria, both from the gut and from other areas of infection; such hepatitis is not only in itself, I believe, a fairly common cause of dyspepsia, but may allow the passage of organisms into the gall-bladder, causing chronic cholecystitis and the formation of gall-stones. Such a hepatitis may be quite unaffected by the removal of a diseased gall-bladder if the source of the infection is not attacked. Sepsis in the bowel, such as mild colitis or appendicitis, must, therefore, particularly be considered.

TREATMENT.

In the treatment of the underlying hepatic dysfunction in the type of case described there are four lines which I have found to give good results. Firstly, there is often an "aura" of especial tiredness and drowsiness, lasting a day or two before the attacks begin, and I have found quite large amounts of acetone bodies in the urine together with urobilin as tested by Ehrlich's aldehyde reagent. For this reason glucose is well worth a trial, and should be given in full doses of 1 to 2 oz. three times a day during this period. Secondly, I have used with great success Decholin, a powerful cholagogue which has had a wide use abroad. This is prepared by Riedel, of Berlin; it is similar to our Felamine and is a pure preparation of dehydrocholic acid—in other words, the active radical of the normal bile-salts. It may be given intravenously, but I have used it only in the form of tablets by mouth (two tablets three times a day). It is undoubtedly a powerful stimulant to biliary excretion, and probably also to the liver cells themselves—in other words, it is a choleretic as well as a cholagogue. Furthermore, such bile-salt preparations directly aid in the absorption of fats and also in the stimulation of the pancreatic secretion by virtue of their adsorbing action upon secretin (Mellanby). Patients should be warned that decholin may cause some abdominal discomfort at first, and this I think is sometimes due to pre-existing stasis of bile in the smaller ducts and the unaccustomed passage down them of larger amounts of bile. Thirdly, I have used drainage of the bile by duodenal catheterisation with success in a number of cases, though it sometimes requires carrying out on more than one occasion. Finally, the diet is, of course, of importance, and in this respect I am quite sure that quantity is of far more importance than quality; in some patients the fat tolerance is quite good, but few are able to take really large meals without some discomfort. Ices and cold drinks seem to be specially bad in cases of cholecystitis, and eggs are apt to cause so much distress that their administration has even been suggested as a diagnostic measure (Schmidt). In migraine without gall-bladder disease it is rare to find any one article of diet that is especially prone to provoke attacks; the patients are, in fact, able to take a free diet without special consideration, and the best advice is just that of moderation.

Briefly to sum up, I have described a type of bilious attack which we may call abdominal migraine, that may occur as a true constitutional disorder or in association with gall-bladder disease. Differentiation may be difficult, and even if the gall-bladder is diseased its removal may not relieve the attacks. The underlying cause in both cases is often a metabolic liver disturbance, and may be treated successfully by the administration of glucose, bile-acids (e.g., in the form of decholin), moderation in diet, and sometimes by duodenal drainage of the bile.

Reviews.

AN INTRODUCTION TO MALARIOLOGY.—By Mark F. Boyd. Bombay: Oxford University Press, 1930. Pp. xiv plus 437, with 82 illustrations. Price 25s. net. (Printed at the Harvard University Press, Cambridge.)

AT last a malaria specialist has written a book for brother specialists, and not for general practitioners or students. The title chosen is over-modest,—for until someone produces a "handbook" of the German type (in three volumes!) the present work, with its wealth of references, will stand as the indispensable daily companion of all who are engaged in practical work on the investigation and control of this group of diseases.

The work is divided into six chapters. The first of these, the introduction, is short, and deals briefly with the historical and geographical aspects, with fuller details regarding the North American Continent. The map of species distribution throughout the world differs materially from that published by the reviewer and his co-author, but it is apparently based on far fewer data. The two following figures, of malaria mortality and Anopheline distribution in the United States, are very interesting. They show how much less widely distributed is the disease than its carrier, and how even the latter is virtually absent from the whole of the Great Plains from the Missouri to the Rockies.

The second chapter is entitled "The Natural History of Malaria," and, omitting practically all references to clinical symptomatology and treatment, deals with attacks, re-infection and relapses, resistance, splenomegaly, infectivity, the invasion of the host, etc., putting into a clear perspective the scattered results of many workers. The next forty odd pages are devoted to the transmission side of the disease, and contain, equally, a wealth of collated observations, many of them by the author himself. A very useful discussion on malaria prevalence follows, and the chapter closes on a discussion Anophelism *sine* malaria.

The third chapter, on malaria surveys, gives in some seventy pages the best account of the subject which we have ever read. The Anopheline side of surveying is reserved for a later chapter. Enough of the elementary mathematics of sampling and statistics are given to indicate the pitfalls that beset the use of figures by the uninitiated. Illustrations are given of the card index system for recording data so widely used by the Rockefeller Foundation.

The splenometric methods of various well-known workers on this subject are described, compared and illustrated, and if the work of Oudendal quoted be accepted, then all the refined measurements associated with the work of Christophers go by the board, which indicates the need for a thorough study of this point by an anatomical specialist.

Blood work is very fully dealt with, but we have never encountered as usual the phenomenon of fainting when the finger is pricked. It is generally supposed to be better not to massage the part pricked, as this induces a leucocytosis. The description of smear making on p. 176 is the opposite of that illustrated in Fig. 25.

The two coloured plates, of the stages of the three parasites, e.g., their appearances in thin and thick films, are no better, unfortunately, than anyone else's,—the former do not come up to those in Byam and Archibald, the latter are better reproduced in the advertising publications of the Bayer Coy. on plasmochin.

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The fourth chapter, on the natural history of Anophelines, is the longest in the book, 137 pages. Beyond registering a protest at the introductory classification of the diptera in which the Pupipara are made an equal division with the Orthorrapha and Cyclorrapha, we have nothing but the highest praise for the truly excellent manner in which the whole subject is presented. To one who, like the reviewer, has given the majority of his working life to this aspect of malariology, this chapter is full of new ideas. The account of larval ecology is the fullest we have yet seen, and hardly a single paper, save those of the Russian workers, is omitted from notice. In the section on the adult we were astonished to read that the last four tarsal joints are "sometimes called metatarsi." This term, in dipterology, is used, if at all, for the first joint of the tarsus, and as there is no homology with the vertebrate leg, is generally falling into desuetude. Edwards' figures of the pilotaxy of Anopheles adults are much better, systematically considered, than Fig. 52 taken from the older work of Christophers, and should be substituted in the next edition. Of omissions in this section we can, however, only remember MacFie and Ingram on the morphology of the abdominal segments in the female, the work of Cornwall and Patton on the salivary secretion, and that of Iyengar on parasitic protozoa, but perhaps the latter is mostly too recent for incorporation in the book. Otherwise the account of the anatomy and life history is beyond criticism. It is worthy of study again and again.

From this the author proceeds to Anopheline surveys, and point after point makes clear that here is no purely laboratory malariologist, but one who has years of experience of getting down into the water himself, as witness his discussion on dippers, when he plumps for a design sufficiently stout to enable it to be used as a weapon against snakes! In this type of work individual preferences inevitably rule the equipment taken into the field, and the reviewer thinks that his own (naturally) is less bulky, but that listed and illustrated is thoroughly practical. No mention is made of Gater's fluid for preserving larvæ, or of Barraud's box for transporting adults long distances. No systematics are included, but a useful list of systematic papers on the species of every region occupies three pages. The pages on "the determination of the malaria vectors" are especially valuable, and are illustrated by excellent original photomicrographs.

The final chapter, on "the relation of surveys to control work," is very thoughtful. Every word is valuable.

Three hundred and sixty references are given in the bibliography, and a good index, so far as we have yet tested it, completes a work which is remarkably free from even unimportant printer's errors, and which from its size, forms a volume of handy size and weight. We tender to Dr. Boyd for his work our admiration and gratitude. It should have a large sale, as no serious worker can possibly be without it.

R. S. W.

STEDMAN'S MEDICAL DICTIONARY.—Eleventh Edition. London: Baillière, Tindall & Cox, 1930. Pp. xi plus 1222, with 22 plates and 400 figures. Price, 35s.

SUMPTUOUSLY bound, fully illustrated, and well printed, this admirable volume is now in its 11th edition,—the first having been published in 1911. In the present edition there have been extensive changes and additions, all the names proposed by the Committee on Nomenclature of the Society of American Bacteriologists being incorporated.

In his preface, Dr. Stedman points out that when the first edition was published, existing medical dictionaries tended to mis-spell; thus the names of alkaloids were spelt without the final "e," thereby doing away with the convenient distinction between alkaloids and glucosides; whilst such offences as "leukocyte" and "Endameba" were beginning to creep into the literature. The great virtue of Stedman's dictionary is that the language in which it is printed is English, and not American.

Looking through the book, we find it admirable. The plate on helminthic ova is admirable, the colour plate on changes in the morphology of the blood is accurate—but, we consider, a little highly coloured. The malaria plate we were disappointed in, for the gametocytes of *P. falciparum* are shown as rounded forms (which they are to begin with in the internal circulation), and "crescents" are not depicted. The colour plate of the differential diagnosis of scarlet fever and scarletiniform eruptions is admirable.

The book is one which every medical library should possess.

R. K.

TROPICAL MEDICINE IN THE UNITED STATES.—By A. C. Reed, M.D. London: J. B. Lippincott Company, 1930. Pp. xviii plus 410, with 60 illustrations. Price, 25s. net. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 18-12.

WE have not the slightest hesitation in saying that this is not a book which we should advise either the student or the practitioner in India to purchase. This remark does not necessarily carry with it any disparagement of the book itself. The author has achieved what he set out to do; he has written a book which is suitable for the ordinary practitioner in the United States of America who is unlikely to go abroad. The information contained therein is certainly not sufficient for a student seeking a qualification in tropical medicine—at any rate of the standard of our L.T.M. in Calcutta—but would probably be enough for the ordinary qualifying examination in medicine.

A study of the chapters on subjects which the reviewer considers himself qualified to criticise does not inspire him with such confidence as would make him refer to the other chapters of the book when he required any accurate information on their respective subjects. The information is seldom actually misleading but there are very few instances in which it is sufficient, for example, to give a practitioner the detailed information necessary for him to undertake the treatment of a patient with any confidence. The writer's lack of personal experience with the disease about which he is writing is frequently demonstrated; he appears, for example, to have obtained the impression that post-kala-azar dermal leishmaniasis is a common accompaniment of the visceral infection and not a comparatively rare sequel. Another example of where his ideas do not appear to be quite clear is his suggestion that microfilariæ are seldom found in the blood of a person suffering from elephantiasis because this clinical manifestation does not usually appear until the adult worms have died.

We did not observe many misprints but surely when the author refers to Linton's alkali treatment in malaria he must mean Sinton's.

The book forms a handy volume and is well printed.

A SYNOPSIS OF MEDICINE.—By H. L. Tidy, M.A., M.D., B.Ch. (Oxon.), F.R.C.P. (Lond.). Fifth Edition. Revised and Enlarged. Bristol: John Wright and Sons, Ltd., 1930. Pp. xv plus 1032. Price, 21s. net.

THE appearance of the fifth edition of Tidy's *Synopsis of Medicine* is a very welcome event. The book in its various editions, since it was first published in 1920, has been a model of accuracy and completeness, and by universal acknowledgment stands unrivalled.

Practically it forms a synopsis of Osler's *Principles and Practice of Medicine*, with many alterations and additions, and the present edition contains new matter on tularæmia, post-vaccinal encephalitis, psittacosis, epidemic pleurisy, acute hæmorrhagic nephritis, bundle branch block, erythrœdema, and many other conditions. Many of the articles have been re-written in accordance with more modern views and knowledge. The

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book will appeal to everyone interested in medicine, from the student to the professor, and of the medical books on the bookshelf one can confidently foretell that it will be among the most thumbed volumes.

In the section on vaccination the recommendations of the Rolleston Committee are given. We can find no reference to peripheral failure as opposed to heart failure and vaso-motor failure.

We would recommend practitioners and students to procure a copy of this unique compilation and to keep it always at hand. The arrangement of headings and the use of various types make it extremely easy for ready reference.

J. D. S.

A MANUAL OF NORMAL PHYSICAL SIGNS.—By W. B. Blanton, B.A., M.A., M.D. Second Edition. St. Louis: The C. V. Mosby Company, 1930. Pp. 246, with 49 illustrations. Price, $3.00.

IN reviewing the first edition of this book the present reviewer said, "In most text-books on physical signs which came into the hands of the student the normal signs are given side by side with the pathological signs. This arrangement is liable to cause confusion in the mind of the student not familiar with the subject. In this book normal signs only are summarised and in a few instances explained and discussed. There is no reference to signs of disease, but abnormalities—not necessarily associated with disease—are included. For the most part the author has adhered to a tabular arrangement for the sake of clarity and brevity.

This is a book that one would like to see in the hands of every second-year student. Twelve hours or so spent in intelligent assimilation of the contents would lay a foundation on which he could build for the rest of his medical career."

Several improvements have been effected in the present edition. The added illustrations are distinctly useful. During the last four years, the reviewer has become more critical regarding the question of suitability of any book for the Indian medical student. He, however, is prepared to endorse his previous review with one reservation, the underlining of the word "intelligent" in the last paragraph. No useful purpose could possibly be achieved by a student committing to memory many of the long lists which the book contains.

METHODS AND PROBLEMS OF MEDICAL EDUCATION. (EIGHTEENTH SERIES.)—By R. M. Pearce, Director of the Medical Sciences. New York: The Rockefeller Foundation, 1930. Pp. 329. Illustrated.

THIS is an interesting collection of thirty articles from authors in different parts of the world. The collection includes 12 papers from the U. S. A., 1 from South America, 2 from Canada, 2 from England, 1 from Wales, 2 from France, 1 from Belgium, 1 from Denmark, 2 from Germany, 2 from Yugoslavia, 1 from South Africa, 1 from India, and 2 from Siam. The articles discuss different branches of medical education. One finds photographs showing the general features of the buildings, detailed plans of the laboratories or other rooms inside the building as well as photographs of the rooms fitted up as laboratories, class rooms, wards or for other purposes. Discussions of a variety of departments like physiology, biochemistry, physics, pathology, out-patient, clinical surgery, ophthalmology, otolaryngology, dermatology, bronchoscopy, preventive medicine, care of ambulance patients, etc., are given. The courses of teaching, the arrangements for research, the nature of the staff, budget estimates, etc., will all provide very useful information. While recognising the difficulties of collection, a specialist or an organiser in any branch of medical science would probably prefer to see all the information about his particular subject from all possible sources all collected in one volume. Such a volume, which might appear to lack in co-ordination, could always be supplemented by information of a general nature. A debt of gratitude is due to the Rockefeller Foundation for the publication of this series of volumes, which provide invaluable information for all those concerned in setting up and equipping medical schools, colleges, medical departments, and the like. The different volumes are not only library books for reference, but call for careful and attentive study by all engaged in medical education and research work. So far as is possible, the reader can here obtain the information which he needs with reference to organisation and equipment in his own particular branch of medical science, without the necessity of a personal tour to Europe and America.

S. G.

REPORT ON THE STUDY TOUR OF THE SECRETARY OF THE LEPROSY COMMISSION IN EUROPE, SOUTH AMERICA AND THE FAR EAST. JANUARY 1929 TO JUNE 1930.—(League of Nations—Health Organisation.) Geneva, 1930.

THIS report has a twofold value—firstly, in giving a bird's-eye view of the present world-position of leprosy, and secondly, in being compiled by a competent medical observer who is not engaged in active practice as a leprologist and who can therefore bring to the consideration of the subject a mind unclouded by prejudices and preconceived ideas. The author's findings make rather dismal reading. It is probable that greater efforts are being made to deal with leprosy than have ever before been attempted; there is no lack of enthusiastic workers in the different countries in which the disease is endemic, and there is equally no lack of sympathetic support from governments and administrations, but much of the effort is ill-directed and, in places, hesitant largely because there is no unanimity of opinion regarding some of the very fundamentals of the disease even among those who are most competent to judge. It is with a view to pooling and co-ordinating the experiences of the leading leprologists in different countries that the present conversations are taking place in the Philippines.

J. M. H.

DISEASES OF THE THYROID GLAND.—By N. B. Foster. London: Baillière, Tindall and Cox, 1930. Pp. v plus 174, with 7 figures in the text. Price, 6s. net.

DR. FOSTER has contributed to this minor monograph series a very interesting account of the diseases of the thyroid gland.

An immense amount of literature has appeared during recent years in connection with thyroid function and disease. The author has managed to compress all that is important into 140 pages.

The anatomy and physiology of the gland are described. In this section very little is said about the inter-relations of the thyroid with other glands and nervous elements, but the description is clear and adequate.

A chapter on simple goitre follows and is very interesting. The success of iodine treatment if commenced early is noticeable. Exophthalmic goitre and hyperthyroidism occupy a considerable portion of the book

Grave's disease is the most important disease of the gland for both the physician and surgeon. The various forms of treatment are discussed, pre-operative and post-operative procedures are described and the value of iodine and radiotherapy is carefully indicated. Dr. Pool contributes a chapter on malignant growths. Carcinoma is by far the most frequent type but even this disease is comparatively rare. Surgical treatment is seldom successful unless the malignancy is limited to an adenoma, and it appears that irradiation offers a better hope of cure in those cases which can be clinically diagnosed. The practitioner will find this book extremely useful. It contains all that is essential. It is well and clearly written and admirably produced.

H. H.

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A SYNOPSIS OF SURGERY.—By Ernest W. Hey Groves, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.), Surgeon to the Bristol General Hospital; Professor of Surgery, Bristol University; Member of the Court of Examiners, Royal College of Surgeons, etc. Ninth Edition, fully revised. Bristol: John Wright & Sons, Ltd. London: Simpkin Marshall, Ltd., 1930. Pp. 676. Price, 7s. 6d. net.

HEY GROVES' *Synopsis of Surgery* was first published twenty-two years ago and the fact that it has now reached its ninth edition is sufficient proof that it meets a definite need. It was originally intended as a revision book for students who had read through a text-book whilst doing their ward appointments and wished to revise their knowledge rapidly and arrange a vast array of facts in an orderly manner in their minds. For this purpose the book is admirable, but it seems to be difficult to convince students that a cram-book of this character is much tougher reading than a text-book and, by reason of the compression necessary, demands a much greater mental effort from the reader than a larger work. Since a certain number of students will, in spite of this fact, be attracted by the conciseness of this work to use it as their only text-book, it is necessary to examine it very critically to make sure that all the teaching is sound and up-to-date. On the whole there is little fault to be found, even such recent improvements in technique as the use of avertin and spinocaine in spinal anæsthesia and the Winnett Orr treatment of compound fractures and osteomyelitis are mentioned, though most examiners would consider these methods to be still on trial and outside the scope of any ordinary examination. The sections on fractures are amongst the best in the book, the methods of treatment given are the most modern, with, as must be expected from Prof. Hey Groves, a strong bias towards operative treatment. Whitman's abduction method of treating fractures of the neck of the femur is given as the routine, instead of the "do-nothing" methods to which unfortunate elderly victims of this accident were formerly condemned with such disastrous results. Operation will not often be required if this admirable treatment is properly carried out and, in cases where it does become necessary, some form of reconstruction operation will probably give the best results. An illustration and a short description of the walking caliper splint appear for the first time. The section on glossitis has been rewritten and that on the thyroid has been rearranged to bring it into line with modern teaching of the relationship between toxic adenoma and exophthalmic goitre. The operation usually done for the latter condition resembles a wedge-resection, that described in the text has been abandoned by most surgeons specialising in this work. The descriptions of the pyogenic infections of the kidney have been brought up-to-date and some obsolete methods of estimating renal efficiency deleted. Thomson Walker's operation of suprapubic prostatectomy is given, but there is no mention of the two-stage method and the indications for it, the recognition of which has played so large a part in bringing down the mortality of these operations. The description of tumours of the testis has been brought into line with modern pathological ideas and the injection treatment of varicose veins described, though quinine urethane is the only sclerosing solution mentioned.

The reference to the use of radium in the treatment of malignant disease is too sketchy to be of any use to the student and the statement that metallic substances which have been exposed to the action of radium are the usual source of the gamma rays is surely incorrect. These, however, are only minor matters. There is one section which contains errors of the first magnitude and that is the section on the treatment of syphilis. To teach that the modern treatment of syphilis consists of three injections of neosalvarsan, followed by a three-months mercury course, to be repeated if the Wassermann reaction is positive, and that a negative Wassermann reaction one year after treatment has ceased indicates a cure is simply grotesque. Such teaching is twenty years at least out of date; it is a heavy addition to the task of a teacher struggling to impart modern ideas to have to combat such old-fashioned instruction in a book which his class are inclined to regard as authoritative, and it is to be hoped that Prof. Hey Groves will take an early opportunity of bringing out a fresh edition, in which this blot on an otherwise excellent book will be removed.

W. L. H.

STEPPING STONES TO SURGERY. (ANATOMY APPLIED TO SURGERY.)—By L. Bathe Rawling, M.B., B.Ch. (Cantab.), F.R.C.S. London: H. K. Lewis & Co., Ltd., 1930. Pp. xvi plus 228, with 97 illustrations. Price, 12s. 6d.

THIS is an admirable little book, exemplifying the clinical type of teaching so characteristic of what is best in British medicine and surgery. It is not a surgical anatomy, but a collection of lectures on those subjects in surgical anatomy which the author's experience as Surgeon to St. Bartholemew's Hospital has taught him to be of special importance. In almost all, the subject is introduced by the exhibition of a surgical case; thus the exhibition of a patient who was thrown off his bicycle, pitched on to his right shoulder, and suffered from a sub-coracoid dislocation of the shoulder joint, leads up to a description of the method of reduction and an exposition of the surgical anatomy of the shoulder joint: cases of fractured patella and internal derangement of the knee joint lead up to a discussion of the anatomy of the knee joint.

The subjects dealt with are the shoulder joint, the elbow joint, the wrist and hand, median and ulnar nerves, the hip joint, the knee, ankle, and foot; the kidney, ureter, prostate, urethra, and testis; the brain, pituitary region, middle ear, fifth and seventh cranial nerves; abdomen, gall bladder, parotid region, and the surgical anatomy of the breast. It will be seen therefore that all the most important subjects are dealt with.

The volume is admirably printed and very well illustrated. It should be of special interest to surgeons, house surgeons, and to the general practitioner.

W. L. H.

CANCER OF THE LUNG, AND OTHER INTRA-THORACIC TUMOURS.—By M. Davidson, M.A., M.D., B.Ch. (Oxon.), F.R.C.S. (Lond.), with a foreword by A. J. Hall, M.A., M.D., D.Sc., F.R.C.P. Bristol: John Wright and Sons, Ltd., 1930. Pp. x plus 173, with 62 illustrations. Price, 17s. 6d. net.

A GOOD deal of literature has appeared during recent years in connection with malignant disease of the lungs. New methods of diagnosis have been discovered and the older methods improved. But even when allowances are made for these facilities of diagnosis it is the opinion of many physicians that this serious disease is increasing in incidence.

Dr. Davidson has had a unique opportunity of studying the subject at the Brompton Hospital, and he has produced a book which may be said to contain all that is important in our present knowledge of tumours of the lung.

Clinical summaries of 22 cases are given and these are of great interest. Diagnostic methods such as lipiodal injections and bronchoscopy are of value for an early diagnosis, and radiology is essential.

The technique of chest radiology has advanced rapidly during recent years and Dr. Stanley Melville contributes a very useful note on this subject.

A satisfactory method of treatment of malignant disease within the chest wall does not exist, and a definite diagnosis is equivalent to signing the patient's death warrant. But surgery is not altogether without a place, for there are doubtful cases of lung tumours which can be attacked. One case is described in which the tumour, thought to be malignant, was found on exploration to be a dermoid cyst and was successfully removed. This book is very readable and exceptionally

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Note for the Medical Profession

Puerperal Mortality.

IT is a matter of frequent comment that the rates of puerperal mortality and morbidity have not been reduced in recent years, although the incidence of sepsis in general surgery is now comparatively very small.

There exists a reasonable explanation of this anomaly.

It is probable that the majority of cases of puerperal sepsis are caused by the introduction of streptococci from without during the course of labour. This is a cause which should be preventable by the use of an efficient germicide.

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well produced. The plates are as good as any of their kind.

There is no doubt that it will occupy a valuable place in the libraries of all physicians who are interested in diseases of the chest.

H. H.

HANDBOOK OF SURGICAL DIAGNOSIS.—By C. E. Shattock, M.D., M.S. (Lond.), F.R.C.S. Edinburgh: E. & S. Livingstone, 1929. Pp. viii plus 678, with 78 illustrations. Price, Rs. 11-4. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

SURGICAL diagnosis is dealt with in this volume by a careful systematic description of the various surgical diseases and conditions. Though the arrangement of the material is concise the books extends to over 670 pages. The only illustrations are radiograms, and this is a pity as simple diagrams or sketches make understanding so much easier for the student—as, for instance, in the description of aneurisms. Reproduction of x-ray pictures is not always easy, and in Fig. 46 it will be seen that the essential details are blurred.

Reference to surgical diseases peculiar to the tropics are found under some of the various headings, as for example filarial elephantiasis, but many well-known tropical conditions are omitted, so that the book will fail to satisfy the needs of students in other than temperate zones.

Senior students will find this volume a valuable guide for reference and for examinations. The mass of surgical facts is carefully arranged and the author's teaching experience enables him to deal with the subject in a lucid and thoroughly reliable manner.

F. P. C.

COLOUR AND CANCER, AN INVESTIGATION.—By C. E. Iredell, M.D. (Lond.), M.R.C.P. London: H. K. Lewis & Co., Ltd., 1930. Pp. vi plus 106. Price, 6s.

THIS is a curious little book. The author may be chasing the moon, but he is Surgeon-in-charge of the Actino-therapeutic department at Guy's Hospital, and therefore in an authoritative position to speak of the effects of wave lengths from different parts of the electro-magnetic spectrum on tumours and on the body generally. The patients dealt with were for the most part those who were suffering from inoperable cancer, and who had ceased to respond to radium and x-ray therapy. Briefly, the author's contention is that exposure to different colours—especially green and violet—favourably influences the condition of a patient with carcinoma. The exposure is given with a "focal machine" and applied to the abdomen, or sometimes to the growth, whilst the patient must lie in an east to west magnetic position.

In order that we may not be accused of taking the work too lightly, we may perhaps quote the author's own summing up of his theory of the action of colour on cancer. "The body has certain oscillatory properties which are capable of being set in vibration by various agencies such as wireless, magnetism, etc. To set these agencies in action too violently has little or no effect in stimulating these vibrations, and it is just as ineffective to over-stimulate as to under-stimulate them. If, however, the stimulus is applied with the right strength and at the right time, very powerful oscillations can be produced. In the case of malignant disease a poison, in some way closely associated with this vibration, is present, and is capable of being removed from the body. Until this is done the normal body vibration cannot assert itself. The last part of the body to experience normal vibration is the seat of the growth, and the cure of cancer depends on the establishment of this normal vibration. An analogy may be found in physics from the way in which a pendulum may be set in motion by very small forces accurately applied."

Very appropriately the book is bound in a violet and green cover.

R. K.

PIERSOL'S NORMAL HISTOLOGY.—Edited by W. H. F. Addison, B.A., M.D. Fourteenth Edition. London: J. B. Lippincott Company, 1929. Pp. 479, with 432 illustrations, 43 of which are in colour. Obtainable from Butterworth & Co. (India), Ltd., Calcutta. Price, Rs. 18-12-0.

THIS very well-known manual has now reached its fourteenth edition, and is an admirable book alike for medical students, pathologists—who wish to look up the normal histology of an organ or part—and laboratory workers. It is well written, very comprehensive, very well illustrated and admirably published. The illustrations are nearly all originals, the material having been collected at autopsy and in the operating theatre. Sections of special interest are those dealing with micro-dissection, tissue culture, supravital staining, frozen sections, and parlodion embedding. In the present edition an account of the phagocytic system has been added, a number of older figures have been withdrawn and new ones substituted. The appendix on laboratory technique is very valuable; whilst the more advanced worker will find the list of selected references most useful.

R. K.

REMBRANDT.—By Dr. J. G. de Lint. Published by J. Philip Kruseman. The Hague. (Holland). Pp. 113, with 64 illustrations.

THIS is the first of a series of monographs, "The great painters and their works as seen by a doctor." The series is to be edited by Dr. de Lint, the writer of this monograph. The monographs will presumably all be in the English language as there is no mention of this monograph being a translation, although it is printed at The Hague and the style has that somewhat stilted character so familiar in a translation.

The subject is treated far more from the point of view of the art expert and the medical historian than from that of the physician.

Rembrandt was extremely prolific both with his pencil and his brush, and Dr. de Lint has diligently unearthed all drawings and paintings which can be said to have any connection whatsoever with the subject of medicine; the result is that the monograph has become a short descriptive catalogue of his various works. The subjects are well arranged in groups, each group forming a chapter under the appropriate heading, for example, "Portraits of Physicians," "Miraculous Healings," "Ophthalmology," etc.

Rembrandt was a great student of anatomy, and by far the most striking picture reproduced in this book is that of the group of physicians—or perhaps students, though it is hard to believe this—listening to a lecture on anatomy by Nicholas Tulp, who is demonstrating on a body of which of the forearm and hand have been dissected.

The publishers have produced a very pleasing volume. The cloth case is particularly attractive, the print clear and the reproductions good. There are a few curious misprints which betray the Continental origin of the book; one which amused the reviewer was an historical note which referred to the Dutch as having "thrown off the Spanish joke."

L. E. N.

MODERN PSYCHOTHERAPY.—By E. Miller, M.A., M.R.C.S., L.R.C.P., D.P.M. (Cantab.). London: Jonathan Cape, Ltd. Pp. 131. Obtainable from Messrs. Butterworth & Co. (India), Ltd., Calcutta. Price, Rs. 3-12.

IN writing so clear, compact and yet so comprehensive a treatise on modern psychotherapy, Dr. Miller has achieved a considerable feat of authorship. While it is not easy to select any one portion of the work for special praise, it is probably the last chapter to which any practising psychotherapist would give the palm. In this chapter Dr. Miller says much that most psychotherapists are constantly thinking and feeling to be true, namely, that no clear conception of the

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process of disease can be obtained in the absence of a knowledge of the effects of organic peculiarities on the mental life, and, *vicé versâ*, of the effects of the emotions upon the activities of individual organs as well as upon the organism as a whole. Like every other student of psychological medicine, Dr. Miller is fully alive to the value of this conception, in that it establishes a link between general medicine and psychology which enables the practitioner to consider every state of health not merely as of body or of mind as separable entities, but as states of the person. In his treatment of the highly complex problem of the psychopathology of the child, Dr. Miller does not pay as much attention as many practitioners in this speciality would have expected to encounter in a book of this sort. In his discussion of the special methods which have been recently developed for dealing with psychopathic children, it is regrettable that Dr. Miller makes no mention of perhaps the greatest pioneer in this direction, namely Dr. Melanie Klein. For the general practitioner, not to mention the surgeon and gynæcologist, the most valuable feature of the book is the section that describes the types of mental disorders and disabilities for which psychotherapy, as opposed to other forms of therapy, is most applicable. In both medical and surgical practice there is still far too much of that kind of advice to patients which begins and ends with: "Take a holiday and pull yourself together." Lastly, Dr. Miller is as aware as anyone of the humbug inherent in much that passes for psychotherapy, so that every reader will smile at the implication anent the ardent advocate of auto-suggestion, counting his guineas (or rupees) while the patient counts his beads.

O. A. B-H.

CORRIGENDUM.

In connection with the review on p. 724 of our issue for December, 1930 of "Minor Surgery and Bandaging" by Mr. G. Williams, M.S., F.R.C.S., the publishers, Messrs. J. & A. Churchill, have asked us to make a correction. The edition reviewed is the 20th and not the 12th, as stated in the review. The book in question is, of course, one which is a classic and a very well-known favourite both with medical students and general practitioners.—(ED., *I. M. G.*).

Annual Reports.

MAURITIUS. ANNUAL REPORT ON THE MEDICAL AND HEALTH DEPARTMENT, 1928. BY J. BALFOUR KIRK, DIRECTOR, MEDICAL AND HEALTH DEPARTMENT, COLONY OF MAURITIUS.

THOUGH this Colony is going through a severe period of financial depression due to the state of its principal industry, sugar, the report shows that the medical department is fully alive. It is astounding how well provided, compared with India, are these small British dependencies in regard to medical aid. Here in an island of 720 square miles and 124,000 population, much smaller than a single Indian district, we find a medical cadre of 26 officers, between them administering 12 hospitals and 27 dispensaries.

The following points are of interest:—

Malaria.—In spite of all the investigation work that has been done on this disease in the island, the incidence is apparently steadily rising; the Director attributes this to the lowered economic status of the population. With the exception of one district, spleen rates have increased in all school children examined, while the death rate from the disease has risen to 6 per cent., and forms 60 per cent. of all deaths due to communicable diseases. And this in spite of the maintenance of 1.5 million feet of drains and canalized streams, and a table, a whole foolscap page long, of new anti-malaria works undertaken during the year. The parasite proportions in films examined at the bacteriological laboratory are *P. vivax* 51 per cent., *P. malariæ* 15 per cent., *P. falciparum* 34 per cent., but the Director of the Laboratory states that he does not consider these figures to represent the true proportions of these parasites in the general population. The situation undoubtedly calls for energetic action, but where is the money to come from?

Filariasis.—A general microfilaria rate of nearly 12 per cent. was found in over three thousand slides representing all parts of the island. An incidence of more than twice this was found in a prison population. There is a suspicion that another species besides *bancrofti* exists locally. *Culex fatigans* is shown to be the only real carrier.

Plague.—In spite of the fact that it was more than a year since the last, sporadic, case energetic measures are carried on.

Small-pox has not occurred since 1913.. Grave doubts are expressed over the vaccination position. Evidently with long security an ignorant population is seeing no reason to get themselves protected.

The child-birth mortality rate is very high, about five times the European average. This again reflects the low social status of the population of the Island.

Anchylostomiasis is rampant; general infection rates run from 74 to 94 per cent. In treating this condition the mixture of oil of chenopodium and carbon tetrachloride formerly given to school children has been abandoned, as the liability to toxic symptoms has been found greater than when either drug is given separately.

Schistosomiasis exists in the Colony, but the local intermediate host has not yet been determined, in spite of a good deal of investigation locally, details of which are given and should be consulted by all interested in this disease.

The Chinese community occasionally show clonorchiasis, and a special report on this is in preparation. Some interesting work on Blastocystis has been done. In fact the bacteriological laboratory under Dr. Barbeau appears a very live force of which the Colony ought to be proud. The whole report is worthy of study by all those interested in administrative medicine.

FIFTY-FIFTH ANNUAL REPORT OF THE CHEMICAL EXAMINER'S DEPARTMENT, BENGAL, FOR THE YEAR 1929. BY B. M. CHAKRAVARTY, F.C.S. CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. PRICE, 10 ANNAS.

THIS report is by Dr. Chakravarty, who took over the officiating appointment of Chemical Examiner after the close of the year, when Lieut.-Col. T. C. Boyd, I.M.S., went on leave. Col. Boyd was in charge throughout the year 1929. The most important feature of the year was that the reorganisation committee of the Medical College, Calcutta, with special reference to the Chemical Department, made its final recommendations to government, and this report is now under consideration.

In the general analytical department (including excise) there was an increase of 237 articles over the previous year's figure of 3,381. In the medico-legal department the number of examinations dropped from 2,412 to 2,251. The annual assay of provision opium, which had been carried out by this Department for many years, has now been transferred to the laboratory of the Chemical Examiner for Customs and Excise.

Research work, subsidised by the Indian Research Fund Association, was carried out on the distribution of antimony in organs after its intravenous injection (in connection with kala-azar), and on ultra-violet light measurements.

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The following cases of medico-legal interest are abstracted from the report:—

Medico-legal Notes.

Alcohol and hydrocyanic acid poisoning (homicidal).—Alcohol and hydrocyanic acid were detected in the viscera of a female sent by the coroner of Calcutta. The deceased was a public woman, aged 25, who entertained visitors with drink until midnight and was found dead in her room on the following morning with all her ornaments missing. The motive of the crime was apparently theft. Hydrocyanic acid is rarely used for homicidal purposes.

Opium poisoning (fatal—in a floating body).—Opium was detected in the viscera of an unknown male forwarded by the Assistant Surgeon, Dhanbad. The deceased was found floating in an unused quarry of a colliery.

Opium poisoning (fatal, injury case).—Opium was detected in the viscera of a Hindu male sent by the Sub-Assistant Surgeon, Banpur (Puri). The deceased fell down from a *bhari* (scaffolding), had blood marks on the cheek and swellings over both ears.

Morphine and alcohol poisoning (homicidal).—Morphine and alcohol were detected in the viscera of a public woman, aged 30, sent by the coroner of Calcutta. The deceased entertained 3 persons at 10-30 p.m. They all took country liquor and beer and became drunk at 2 a.m. She was removed to hospital in an unconscious state at 3-15 a.m. and died next day at 5-30 a.m.

Arsenic poisoning (fatal and non-fatal, homicidal).—Arsenic was detected in the viscera of one, Sadhu Turi, and in the stomach-washings of his father, Badan Turi, and white arsenic in the cooked rice, forwarded by the Assistant Surgeon and Subdivisional Officer, respectively, of Asansol. Badan Turi worked as a cook under a European Colliery Manager. One day, his son, Sadhu Turi, brought food cooked from his house to his master's bungalow. Both father and son partook of the food. The father felt sick after having a few mouthfuls of the same and threw it away. He (father) noticed some whitish powder in the food. Both father and son began to vomit and were sent to hospital with symptoms of gastro-enteritis. The father recovered but the son died.

Arsenic poisoning (abortifacient—fatal).—Arsenic was detected in the vomited matters, in a small quantity of white pasty substance (said to be arsenical soap) and in the viscera of a Hindu female, aged 22, sent by the Assistant Surgeon, Tezpur, Assam. The deceased, a pregnant woman, was said to have taken a white pasty substance (arsenical soap) and had vomiting and purging before she expired.

Alcohol and atropine poisoning (non-fatal, drugging and robbery).—Atropine was detected in the glass tumbler and alcohol in the glass bottle forwarded by the Deputy Commissioner of Police, Calcutta, with a history that an upcountry man visited a public woman at midnight with a bottle of brandy. They indulged in drinking until 3-30 a.m. when the woman felt uneasy and went to sleep. She got up at 6 a.m. and found her ornaments missing from her person as well as from her chest of drawers.

Aconite poisoning in quack medicines (fatal).—The Civil Surgeon of Kamrup forwarded the viscera of a Hindu male, a quantity of dark brown liquid, pieces of roots and stems and powdered spices for examination. A village quack administered some condiments and roots to the deceased for relief of pain. The victim appeared as if intoxicated with bhang and subsequently died. Aconite was detected in the viscera, dark brown liquid and in the powdered spices.

Oleander poisoning (abortifacient—fatal).—Oleander was detected in the viscera of a Hindu female, aged 20, forwarded by the Civil Surgeon, Angul, with the history that the deceased was seen quite well until 9 or 10 a.m., but was found dead in her house at about 12 noon the same day after vomiting and purging. At the post-mortem examination, a fœtus of about 6 months was found in the uterus.

Tar-product (containing phenoloids, poisoning—fatal, accidental).—A tar product containing phenoloids was detected in the viscera of a Muhammedan male, aged 55, forwarded by the Assistant Surgeon, Sylhet, with a history that the deceased who was said to be a lunatic, took a quantity of hycol solution and died.

Marking-nut (Semicarpus anacardium), poisoning as quack medicine (fatal).—The Civil Surgeon, Angul, forwarded some nuts and a quantity of vomited matters, etc., of a Hindu male with the history that the deceased took some milk boiled with marking-nuts for relief of pain in the chest and had vomiting and purging and died after a few hours. The nuts forwarded were identified to be marking-nuts and an irritant substance resembling the juice of marking-nut was detected in the vomited matters.

Veronal poisoning (fatal).—The coroner of Calcutta forwarded the viscera and urine of an Anglo-Indian male, aged 36, with the history that the deceased was found lying unconscious in the Eden Gardens at about 10-30 a.m. and was removed to the Medical College Hospital where he died next day at 12-30 a.m., i.e., about 26 hours afterwards. Veronal was detected in the urine. Vomited matter of the deceased was also sent by the Deputy Commissioner of Police but no poison was detected in it.

Quinine poisoning (fatal—accidental).—Quinine was detected in the viscera of a Hindu female child, aged about 7 years, forwarded by the coroner of Calcutta with the history that the deceased was suffering from fever for a week. There were two packets of powder on a shelf, one of which contained calomel and the other contained one drachm of quinine. By mistake quinine powder was given instead of calomel and the child became worse in ten minutes and died half an hour after her removal to hospital.

The case is interesting from the fact that fatal quinine poisoning is rare and that one drachm of quinine proved fatal to a child of 7.

Abrus precatorius poisoning (homicidal—fatal).—The Subdivisional Officer, Dumka, S. P., forwarded pieces of thorn-like substance with the history that a Santalin widow had some properties and her husband's younger brother who was likely to inherit the property after her death, was not on good terms with her. So she had executed a deed adopting her brother's son. While asleep one night, an unknown person came at midnight and inserted a thorn in her chest. She extricated the thorn-like substance from her chest and kept it. Next morning she went to her brother's house in another village. On the fifth day after the injury she felt serious pain in her chest and a local doctor was called in. She could then speak with great difficulty. She died on the 7th day after the injury. *Abrus precatorius* was detected in the thorn-like substance. *Abrus precatorius* is known to be used to poison cattle, but in this particular case, it is interesting to note, it has been used for homicidal purpose.

LEAGUE OF NATIONS. ANNUAL REPORT OF THE HEALTH ORGANISATION FOR 1929. OFFICIAL NO. A-9, 1930, III (C.H. 836), JULY 1930, N. P.

UNTIL one studies this report, one has but a very hazy and inadequate idea of the tremendous amount of work carried out by the Health Organisation of the League. Whatever views one may have about the value of the political work of Geneva, there can be absolutely no doubt concerning the supreme value of its Health Organisation, which, by bringing all countries together, must really exercise a powerful influence for internation agreement and amity. The sixty-two pages of the report are a worthy record of useful activity, but they are too condensed to make any discussion practicable. One can only record the principal subjects dealt with during the year.

The committee sent commissions of varying numbers to prepare plans for the reorganisation of public

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health departments in Greece, China and Bolivia, and for a survey health conditions in the Pacific Islands. Public health matters of a general applicability were the definition of still-birth, the age-spacing of vital statistics, and the standardisation of death certificates, including the drawing up of three classified lists of causes of death, long, medium and short.

Of specific diseases worked upon, cancer of the uterus, anthrax, leprosy, diphtheria, scarlet fever, and malaria were the chief. The despatch of the Malaria Commission to India is recorded, the report of which has recently been dealt with editorially in these columns. Researches into the fumigation of ships were undertaken, also into the alarming spread of syphilis in Bulgaria.

Of a budget of nearly two million Swiss francs, about nine lakhs of rupees, for 1930, nearly one-third comes from the International Division of the Rockefeller Foundation, which thus again appears as one of the most beneficent of human activities.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1929. BY LIEUT.-COL. T. D. MURISON, D.P.H., I.M.S., DIRECTOR OF PUBLIC HEALTH, ASSAM. SHILLONG, PRINTED AT THE ASSAM GOVERNMENT PRESS, 1930. PRICE, RS. 2-3.

To the minds of most the name of Assam brings a picture of a province of tea gardens and the diseases of kala-azar and malaria; and the ordinary man may wonder how the province is faring in these respects. This report does not review the economics of the tea trade in Assam during 1929 (though there is no reason why it should not) but it does give us some cheerful news about health matters. The birth rate was high, 32.77 per mille, and the death rate was comparatively low, 20.91. The birth rate had gone up and the death rate had gone down in comparison both with 1928 and the preceding ten years. Registration is still defective in many places but the general trend of these rates cannot be denied. The birth rate for 1929 is higher than that for Bengal, Burma and the N. W. F. Province, and the death rate is lower for 1929 than any other province in India. There was also a satisfactory improvement in the infantile mortality rate recorded, which was 157.44 per 1,000 as against 172.01 in 1928. As may be expected, the year was a mild one for epidemics despite the fact that there were some very serious floods in the Surma Valley and in Nowgong. Such floods are usually accompanied by big outbreaks of cholera; such was not the case in 1929 and there is no doubt that the seriousness of the situation was promptly recognised by the Public Health Department which took prompt measures to prevent and check the spread of cholera. Anti-cholera inoculation was very favourably received and the impression is conveyed in the report that the large number of inoculations done was mainly instrumental in achieving the satisfactory result which was to some extent unexpected, as cholera has hitherto been almost a constant concomitant of Assam floods. The Director of Public Health is cautious as to the protective value of bacteriophage which was also used in some epidemics and which is now being supplied to tea gardens in increasing quantities from the Pasteur Institute.

The reduction in mortality has been largely in the items of "fevers" which includes malaria and kala-azar. The measures directed against kala-azar by widespread survey and treatment centres have been eminently successful, and there is no doubt whatever that the energetic action of the Assam Government in this direction has reduced the present epidemic of kala-azar almost to insignificant proportions. The Public Health Department especially are to be congratulated on the results achieved; in 1929 the recorded deaths fell from 1,660 to 1,405 and the number of cases treated rose from 23,576 to 23,804. The rise in the number of cases treated was not due to any severe extension of the disease but to increased survey especially in the Garo Hills. The kala-azar campaign has been expensive—much more expensive in proportion than the Bengal Government for instance could afford to undertake, though in both provinces the mortality has been steadily reduced during the last five years. The system of public health administration in Assam calls for some note. The Civil Surgeons and the medical department are still the main executive branch of public health activities in the districts; in the case of kala-azar this has worked excellently, since treatment has been the mainspring of the campaign, yet the Director of Public Health feels that this is really a definite hindrance to general public health progress in the present system, whereby the Civil Surgeons of districts are the executive health officers of the districts, and he instances cases where owing to the pre-occupation of the Civil Surgeon with other duties considered to be of prior importance, public health investigation and control have materially suffered. The Government of Assam in their resolution on the report, while agreeing with the Director of Public Health to some extent, hesitate, as they state, to upset arrangements which have been proposed for a comprehensive public health service for the province and think it would be unwise in present circumstances to deprive the Civil Surgeons of their ultimate responsibility for both preventive and curative work. We think this outlook short-sighted and activated only by immediate and local circumstances. Malaria, as we have stated, is an ever-present menace to the health of Assam, and the Director of Public Health pleads for a much wider investigation of the disease in the province. Certain anti-malarial work is being carried out in various towns but without adequate investigation, policy and control. Government propose to institute an investigation into the malaria conditions throughout Assam, co-operating in this measure with the Indian Research Fund Association, the Pasteur Institute of Shillong, and the employees of labour in Assam. Such a step will be a wise and statemanlike proceeding and the outcome will be of great interest and value not only to Assam but to the whole of India.

An important step has been the appointment of a special public health engineer to the province. Such an officer is of course absolutely essential in every branch of progress in environmental public health. In 1925 mobile epidemic units were established in the province and have done excellent work in combating outbreaks of various epidemic disease. There are now five such units, but more are required. Each consists of 3 Sub-Assistant Surgeons and 6 disinfectant carriers. They have been particularly successful in popularising anti-cholera inoculation amongst the civil population, especially in rural districts.

There are many other interesting details in the report which it is not possible to summarise here. The whole report is interesting reading and reflects great credit on the Director of Public Health and his staff. The record of work done and the spirit pervading it are excellent.

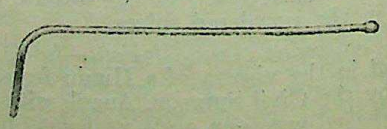
A. D. S.

Correspondence.

A PTERYGIUM DIRECTOR.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I am sending you herewith a pterygium director—devised by me and made in Gulbarga—which



I find extremely useful in the transplantation operation, inasmuch as it helps to glide the needles along the

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thin groove easily without any chance of injuring the sclera below or penetrating the conjunctival tissue at random before the required depth is reached: moreover, it helps to shove in the apex of the pterygium without any trouble in the pocket formed by the gliding movements of the director. The director that is enclosed herein is meant for the left eye. A similar one for the right eye can very easily be prepared locally at a very small cost.—Yours, etc.,

S. B. SURTI, F.R.C.S., D.P.H. (Irel.),
Civil Surgeon.

"FLORA COTTAGE,"
GULBARGA DN.,
The 28th December, 1930.

(*Note.*—We have shown this director to an ophthalmological specialist who has expressed some doubt as to whether it would facilitate the transplantation operation. However, as Dr. Surti has found the instrument useful, it is possible that others may do so. We have therefore had a drawing of the director made and have reproduced it herewith.—ED., *I. M. G.*)

LIZARDS AND MALARIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have recently received a letter from a village reconstruction and public health society in which attention is drawn to the killing of lizards in the locality, as their skins are of value in making ornamental footwear. The letter complains that this killing of lizards is leading to an increase of both mosquitoes and malaria in the village. As the subject may be of some interest, I referred it to the Director of the Zoological Survey of India, and enclose a copy of his reply. The wholesale destruction of lizards in the interests of feminine footwear would appear to be a factor in increasing malaria in Bengal.—Yours, etc.,

SARASI LAL SARKAR,
Civil Surgeon.

NOAKHALI,
29th December, 1930.

Dated, Indian Museum, Calcutta, 15th November, 1930.

FROM—Lt.-Col. R. B. Seymour Sewell, M.A., SC.D., F.A.S.B., F.Z.S., I.M.S., *Director, Zoological Survey of India.*

To—The Civil Surgeon, Noakhali.

IN reply to your memorandum No. 2116/VII-3-30, dated the 11th November, 1930, the question that you raise regarding the possibility of a connection between the killing of lizards, presumably *Varanus,* and the increase of diseases, such as malaria, etc., raises a point of very considerable interest. At the present time, however, our knowledge of the general habits and food-supply of these lizards renders it impossible to give you any definite reply regarding such a possible connection; but the *Varanus* lizards are known to feed with avidity upon eggs of all kinds. They are also known to feed upon such animals as rats and snakes. It is, therefore, probable that in a riverine district, such as Noakhali, *Varanus* feeds upon *Tropidonotus piscator,* the common water-frequenting snake, either adult or young, or on its eggs. Any diminution, therefore, in the number of *Varanus* might lead to an increase in the number of *Tropidonotus* and since these water-snakes feed on fish, mostly of small size, this might in turn lead to an increase in the number of mosquito-larvæ, since many small fish feed on these larvæ. I have no information regarding the species of Anophelines that act as malarial carriers in the Noakhali district, but if these customarily breed in areas frequented by *Tropidonotus* there might very easily ensue an increase in the malarial carriers and so a consequent increase in the incidence of malaria. The above biological chain is, of course, a purely hypothetical one, but it would be extremely interesting to have an investigation carried out to see whether or not such a sequence actually occurs.

I may point out that the species of lizards of the genus *Varanus* have already been put on the protected list by the Government of Bengal, and I understand that the Government of Bengal has placed a total ban on the killing of these animals, but I am not certain on this point, as I do not possess a copy of the regulations. The indiscriminate killing of a large number of these lizards, such as is stated to be going on in Noakhali, is now illegal.

(*Note.*—Dr. Sarkar's letter recalls to mind a passage in the *Origin of Species,* which, if we remember rightly, deals with the connection between old maids, cats, mice, bees and clover. We fear, however, that both Darwin and Dr. Sarkar are dealing with that curse of statisticians—the partial correlation.—ED., *I. M. G.*)

INTRAVENOUS QUININE IN MALARIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have read with much interest in your issue for October 1930, the letter from Dr. D. M. Vasavada on intravenous quinine injections.

As this place is a hotbed of malaria, I deal with several hundred malaria cases each year, and for the past few months I have been in the habit of giving quinine intravenously, having abandoned the intramuscular route as, in some cases, it resulted in abscesses. Since reading Dr. Vasavada's letter I have given more than a hundred intravenous quinine injections, using 2 c.c. of distilled water for five grains of quinine and 4 c.c. for ten grains, injecting very slowly, and in not a single instance have I seen any untoward result.

From my records I note that the patients who received four 10-grains intravenous quinine injections on alternate days showed no relapse for a longer period than those who received grains 20 orally on four consecutive days. I believe saturation of the system with quinine may be brought about more conveniently and easily by the intravenous route than by any other.

I trust your readers, especially those working in estates where the main question is to deal with malaria, will try intravenous injections and report their results.—Yours, etc.,

S. N. DAS.

KAJURICHERRA TEA ESTATE,
SYLHET DISTRICT,
The 5th January, 1931.

(*Note.*—The true position with regard to intravenous administration of quinine, we believe, has now been cleared up in several recently published papers, including some by Col. Sinton, I.M.S. It is *the* method of election in dealing with a severe or comatose case of malaria, where quinine cannot be taken by the mouth. In order to avoid the fall of blood pressure which occurs with such injections, it may be preceded by an intramuscular injection of liquor adrenalin or of pituitrin. The effect of such an intravenous injection of quinine on the malaria parasites is immediate and dramatic; in fact the drug can actually be tasted in the mouth before the intravenous injection is completed. On the other hand, as soon as the patient can take quinine by the mouth, the intravenous injections should be supplemented by quinine orally. Otherwise, a relapse is likely.—ED., *I. M. G.*)

Service Notes.

APPOINTMENTS AND TRANSFERS.

MAJOR-GENERAL J. W. D. MEGAW, C.I.E., has been nominated to be a member of the Council of State.

Lieutenant-Colonel H. E. Shortt has been appointed as Director, Pasteur Institute of India, Kasauli, with effect from the 2nd February, 1929, but will remain

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on foreign service under the Indian Research Fund Association as Director of the Kala-azar Commission, until further orders.

Lieutenant-Colonel W. L. Harnett, M.B., F.R.C.S., is appointed to act as Professor of Surgery, Medical College, Calcutta, and Surgeon to the College Hospital, with effect from the afternoon of the 27th June, 1930, *vice* Lieutenant-Colonel Sir Frank Connor, *Kt.*, D.S.O., F.R.C.S., I.M.S., reverted to military duty. He is also appointed to officiate in addition as Professor of Clinical and Operative Surgery, Medical College, with effect from the same date.

Major H. E. Murray, M.D., M.Ch., I.M.S., First Resident Surgeon, Presidency General Hospital, Calcutta, is appointed to act as Superintendent of that institution, *vice* Lieutenant-Colonel A. H. Proctor, I.M.S., granted leave.

Major S. N. Mukherji, F.R.C.S., I.M.S., is appointed to act temporarily as Professor of Clinical and Operative Surgery, Medical College, Calcutta, till 31st March, 1931, *vice* Lieutenant-Colonel W. L. Harnett, I.M.S.

Major A. C. Craighead, M.B., will continue to officiate as Director, Pasteur Institute of India, Kasauli, until further orders.

Captain V. S. R. Pandit has been appointed as Offg. Executive Officer, Hyderabad (Sind) Cantonment, in addition to his ordinary duties, with effect from the 26th November, 1930, *vice* Captain S. P. Joshi, M.B., vacated.

Captain Robert Merrick Lloyd Still has been appointed to the I.M.S. (on probation), with effect from the 17th November, 1930.

LEAVE.

Colonel G. Hutcheson, M.B., Inspector-General of Civil Hospitals and Prisons, Assam, has been granted leave for one month and seven days, with effect from the 8th January, 1931, preparatory to retirement.

Lieutenant-Colonel A. G. Tresidder, C.I.E., M.D. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), I.M.S., Civil Surgeon, Nasik, is granted leave on average pay for three months followed by leave on half average pay for three months and twenty-two days, with effect from 7th February, 1931, or subsequent date of availing, pending retirement.

Lieutenant-Colonel J. L. Lunham, M.B., B.Ch. (R. U. I.), F.R.C.S.I., D.T.M. (Cantab.), I.M.S., is granted leave on average pay for two months and twenty-one days followed by leave on half average pay for three months and six days, with effect from 10th March, 1931, or subsequent date of availing, pending retirement.

Lieutenant-Colonel A. H. Proctor, D.S.O., M.D., F.R.C.S.E., I.M.S., Surgeon-Superintendent, Presidency General Hospital, Calcutta, is allowed leave for eight months, with effect from the date on which he avails himself of the leave.

Lieutenant-Colonel J. Cunningham, C.I.E., M.D., Director, Pasteur Institute of India, Kasauli, has been granted, preparatory to retirement, leave for 28 months, with effect from the 2nd February, 1929.

Major W. J. Webster, M.C., M.B., Supernumerary Officer attached to the Haffkine Institute, Bombay, is granted combined leave for one year, with effect from the 1st September, 1930.

PROMOTION.

Colonel W. V. Coppinger, C.I.E., D.S.O., M.D., F.R.C.S.I., has been promoted to the rank of Major-General with effect from the 16th September, 1930.

RETIREMENTS.

The King has approved of the retirement from the Service, with effect from the 28th October, 1930, of Major-General F. H. G. Hutchinson, C.I.E., M.B., K.K.S.

The King has approved of the retirement from the Service, with effect from the 27th November, 1930, of Brevet-Colonel S. R. Christophers, C.I.E., O.B.E., F.R.S., M.B.

The King has approved of the retirement of Lieutenant-Colonel H. R. Dutton, C.I.E., F.R.C.P., with effect from the 21st November, 1930.

Notes.

QUINO-PLASMOQUINE.

OUR readers are by now well aware of the very important rôle which Plamoquine plays in the eradication of malarial infections, and its special value in destroying the gametocytes of *Plasmodium falciparum*. The article by Col. Sinton in our issue for last November faithfully reflects the value of the drug, its exact rôle, and its limitations.

The whole trend of recent opinion has been that the doses of Plasmoquine originally advised were too large for safety. The Plasmoquine Compound tablets contained Plasmoquine 0.01 gm. (1/6th grain) plus 2 grains of quinine. This meant that if the patient was to receive an adequate dose of quinine daily, he would get more Plasmoquine than was advisable. Accordingly, Messrs. Bayer-Meister Lucius have now introduced a new tablet, "Quino-Plasmoquine"; this contains 0.01 gm. of Plasmoquine (1/6th grain), plus 0.2 gm. of quinine, or 4½ grains. Administration of two of these tablets twice daily means that the patient will receive daily 18 grains of quinine and 0.04 gm. of Plasmoquine.

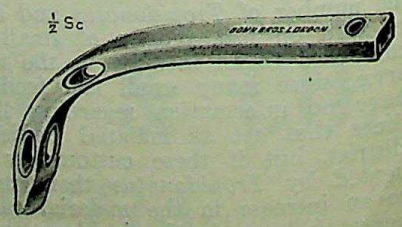
We have so far tried the new formula on three patients; it has been well tolerated and in each case has apparently led to complete cure. Further trials are being carried out. The tablet at least has the merit of approximating much more closely than did the tablet Plasmoquine Compound to the standards which recent work in India, the Straits Settlements, and the Dutch East Indies have laid down as advisable.

The Indian agents are the Havero Trading Co., P. O. Box 2122 Calcutta; P. O. Box 642, Bombay; P. O. Box 1271, Madras; Messrs. Freudenbers & Co., Colombo, and Messrs. Finlay, Fleming & Co., Rangoon; and they will be glad to supply literature and quotations.

A COMBINED METAL MOUTH-OPENER AND AIRWAY.

MESSRS. DOWN BROS., of 21 and 23, St. Thomas's Street, London, have made to Mr. McCardie's design a combined metal mouth-opener and airway which he finds very useful in anæsthetic work. It is flatter than the ordinary boxwood wedge and usual type of airway, and has smooth, bevelled ends; it is therefore more easily introduced between the teeth into the mouth, and cannot damage the throat. The airway being made of metal can be subjected to repeated sterilisation without injury, and is more durable than the boxwood wedges in common use. It is made in three sizes.

½ Sc



It is thought that this mouth-opener and airway will prove helpful to others who give anæsthetics.

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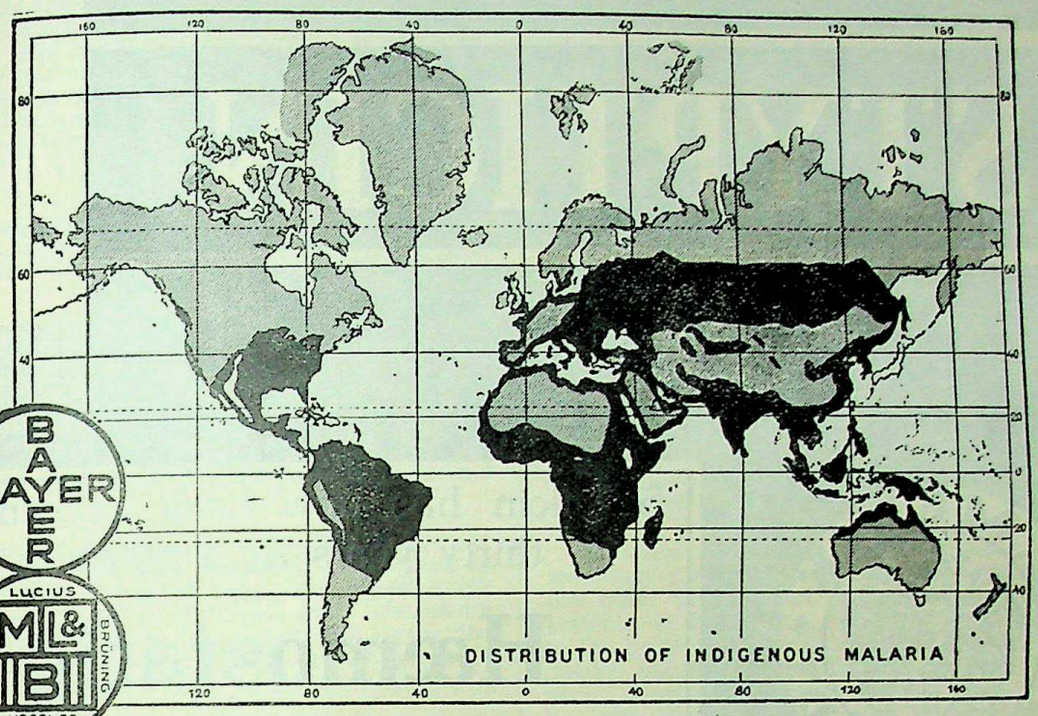
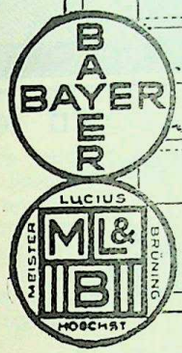
"Bayer-Meister Lucius"





'PLASMOQUINE'

the renowned new

Anti-Malaria-Remedy

with a specific action upon the gametocytes.

For combined

Plasmoquine-quinine-Therapy

Quino-Plasmoquine-Tablets

(ctg. 0,01 gm. Plasmoquine + 0,3 gm. quinine each)

and

Quino-Plasmoquine-Solution

(ctg. 0,02 gm. Plasmoquine + 0,6 gm. quinine pro amp.)

contain these drugs in the best proportion

For continued treatment of all three forms of Malaria.

Especially suitable for individual prophylaxis, sanitary measures and mass-treatment.

Literature and full particulars on application :

"Bayer-Meister Lucius"

Pharmaceutical Department,

HAVERO TRADING CO., LTD.,

P. O. Box No. 2122, 15, Clive Street, CALCUTTA.

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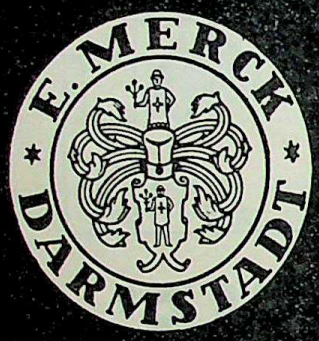
STYPTICIN



E. MERCK
DARMSTADT

Stypticin has now been known for thirty years as a reliable

Hæmostatic

which is completely free from untoward by-effects. To facilitate its administration, it is supplied in the following forms.

For oral use:

Stypticin Tablets, 0.05 gm. (gr. 3/4) in tubes of 20.
Stypticin Powder, in bottles of 1 gm., 5 gm. and 10 gm.

For hypodermic injection:

Stypticin solution 10 %, in ampoules of 1 c.c., boxes of 5.

For local application:

Stypticin Gauze, 30 %, in boxes containing 2 metres.
Stypticin Wool, 30 %, in boxes containing 2.5 gm. and 5 gm.

Agents in India:—

MESSRS. MARTIN & HARRIS, LTD.,

Rowlette Building, 17, Prinsep Street, CALCUTTA

119, Parsi Bazar Street, Fort, BOMBAY

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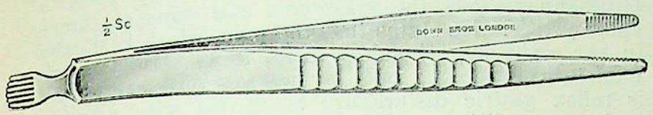
A COMB-DISSECTING FORCEPS.

MR. WALTER SALISBURY, M.D., M.S., F.R.C.S. (Northampton), writes:—

"The comb-dissecting forceps shown in the accompanying illustration has been made to my design. The comb end is rigid and the blades flexible. It embodies the principle of the well-known 'Kelly's comb' and is most useful in performing the radical operation for cancer of the breast. After the fascia has been divided along the front of the axillary vein with a light touch



of the scalpel, the forceps is held in the reverse position and the comb sweeps the axillary contents away from the posterior aspect of the vein, commencing at the apex of the axilla. Branches of vessels and nerves are displayed at their origin and clamped or preserved as desired. The proximity of the comb to the handle enables this to be accomplished with ease and precision.

I have found the forceps useful for similar types of blunt dissection elsewhere, especially for stripping fascial or omental structures away from vessels, pedicles, ducts and the necks of hernial sacs. The blades meet at the point only. The instrument serves the double purpose of dissecting forceps and Kelly's comb so that one instrument less need be taken to a breast operation."

It is made in stainless steel by Messrs. Down Bros., Ltd., St. Thomas's Street, S. E.

EPINALIN, B. W. & CO.

IF the medical profession has practically given up the search for a cure for the common cold, the big chemical firms have by no means done the same. Yet this problem is one of the most important in the whole field of medical research. In this connection we have recently received from Messrs. Burroughs, Wellcome & Co. a 10 c.c. phial of their new preparation "Epinalin"—a combination of adrenalin and ephedrine sulphate, for use in an atomiser.

Having received this interesting preparation, we tried it in person, and also—on the principle of "trying it on the dog"—lent it to a friend. The results were extremely successful; a single spray application will remove all stuffiness and symptoms for a period of 24 hours. The preparation is one that merits the real attention of the medical profession, for it is of undoubted value in a condition which is equally universal and distressing. The following are notes with regard to this new preparation by Messrs. Burroughs, Wellcome & Co. Each c.c. contains adrenalin, 0.0001 gm. (= 1 in 10,000) and ephedrine sulphate, 0.02 gm. (= 1 in 50).

In "Epinalin" the powerful but relatively transient action of adrenalin is followed by the prolonged action of the ephedrine.

"Epinalin" has been found valuable as a nasal spray in asthma and hay fever; in engorged and catarrhal conditions of the nose; to shrink the nasal mucosa, in order to aid drainage in sinus suppuration; and preparatory to rhinoscopy. "Epinalin" may also be applied on gauze or a swab to the turbinates, or to small accessible bleeding points, such as tooth sockets, or after tonsillectomy.

"Epinalin" is issued by Burroughs Wellcome & Co., in bottles of 10 c.c. and 25 c.c.

ACRIFLAVINE, B. D. H.

THE world owes to the late Professor Ehrlich not only salvarsan for the cure of syphilis, but also the introduction of certain synthetic dyes in the treatment of septic wounds. The Great War found aseptic surgery, with all its elaborate and ritual-like paraphernalia, enthroned, but aseptic surgery broke down on the sodden and septic battlefields of Flanders, leaving the surgeons to search for some reliable antiseptic for septic wounds. It was in these circumstances that the use of the flavines, and especially of Acriflavine, came into practice.

A recent and very interesting brochure issued by the British Drug Houses, Ltd., deals with their preparations of Acriflavine, Euflavine, and Proflavine. The flavines are derivatives of the base acridine, which has three benzene rings and an N and CH groups attached. Acriflavine is di-amino-methyl-acridinium-chloride hydrochloride: Euflavine is neutral Acriflavine with one molecule of HCl removed; and Proflavine is di-amino-acridine-sulphate. Acriflavine itself is a yellowish red crystalline powder, extremely soluble in water and in normal saline; the solution can be used without filtration and it resists boiling. It is therefore almost the ideal antiseptic, but for intravenous injection the neutral Euflavine is preferable.

The chief claim made for Acriflavine is that it is absolutely non-toxic to tissues and to leucocytes; unlike other antiseptics it is far more efficacious in the presence of blood and serum than in their absence; in the presence of serum it is 800 times as efficient as phenol and more than 20 times as powerful as mercuric chloride. As used in the usual strength, a 1 : 1000 dilution, it is claimed to be absolutely non-irritant to tissues, including mucous membranes. The solutions are also stable when exposed to temperatures up to 130°C.

The uses of these preparations are innumerable. In the first place Acriflavine lotions and even ointments may be used in the treatment of septic wounds and sores. Bennett, Blacklock and Browning, (*Brit. Med. Journ.*, 1922, II, p. 306), analyse the results of its use in more than 1,000 such cases. As a perineal dressing Crawford uses it in a 1 : 1000 emulsion in paraffin. In gonorrhœa it is now widely used as a local injection in both sexes, as an isotonic solution of 1 : 1000 strength in normal saline. Here the brochure gives a brief summary of the very many reports of interest, and a selected bibliography which will be of interest to all concerned in this type of practice. The intravenous use of Acriflavine solutions has been recommended in cases of meningococcal septicæmia, gonorrhœa, and phthisis; its local application has a very wide range of application, including septic conditions of the throat, mouth, in dermatology, dentistry, and ophthalmic surgery.

Euflavine, being neutralised Acriflavine, is better suited for intravenous use than acriflavine itself. It has been extensively tried in cases of gonorrhœa, rheumatism, influenza, pneumonia, puerperal fever, erysipelas, epidemic encephalitis, etc. Proflavine is reported to be of special value in ophthalmic surgery (*Lancet*, 1919, I, p. 1112).

The B. D. H. preparations of these drugs are numerous, including powders, emulsions, ointments, bougies, pessaries, suppositories, tablets for preparing solutions, and ready prepared solutions in bottles and ampoules.

Surgeons and indeed all engaged in general medical practice may be interested in this small brochure, which summarises the present position with regard to the flavine preparations. It can be obtained from the British Drug Houses, Ltd., London, N. 1; the Indian agents are Henry S. Clark & Co., 8-10, Waterloo Street, Calcutta and Byram Mistry, 19, Parsi Bazar Street, Fort, Bombay.

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TABLET COD-LIVER OIL.

THE keeping properties of cod-liver oil in India are very doubtful, whilst, in spite of the great value of the oil in cases of defective nutrition, rickets, osteomalacia, etc., it is often very difficult to get patients to take it. Under these circumstances medical men in India may be interested in the cod-liver oil tablets made by McCoy's Laboratories, Inc., 62-70, West 14th Street, New York. The firm are strictly ethical in their advertising, and are anxious to receive reports as to the merits or otherwise of this product. The preparation is one which obviously may be of interest to readers in India, and the Indian agents, Messrs. Muller, Maclean & Co., Inc., 43, Bentinck Street, Calcutta, will be glad to furnish further information on request.

PITUITARY (POSTERIOR LOBE) EXTRACT, B. D. H.

A NEW brochure has recently been issued by the British Drug Houses, Ltd., London, N. 1, on their preparation "Pituitary (Posterior Lobe) Extract, B. D. H." It is claimed that each batch of this preparation is tested in their physiological laboratory for pressor action and for oxytocic activity, and kymographic records reproduction fully bear out the truth of these claims. This preparation is now issued in two strengths; the original strength of 10 international units per c.c., and a new strength of 4 international units per c.c. Each batch is tested and standardised in accordance with the Therapeutic Substances Regulations, 1927.

The uses of this preparation are very widespread. It is of course of supreme value in labour, but is also indicated in cases of surgical shock, intestinal stasis, hæmorrhage—of whatever origin, polyuria in diabetes insipidus, and in insulin hypoglycæmia. The brochure will be sent to any physician on request.

MESSRS. N. POWELL & CO., BOMBAY.

READERS of this journal residing in western India are very familiar with the name of this well-known firm of manufacturing chemists, whose work during the war was of special value to the War Office, to whom they were special contractors, and to the Government of India and the Government of Bombay. A note in the *Times of India*, for the 6th of December, 1930, informs us that Messrs. N. Powell & Co. are extending their manufacturing plant and factory in response to the demand for Indian-made products. Much as we deplore the present—quite unreasonable—boycott of reliable British drugs and instruments, yet we realise that there is a necessity to develop home made Indian industries in this connection, *as long as the firms concerned are reliable ones*. In this connection, Messrs. N. Powell & Co. are carrying out a real service to the country.

"SEDICYL."

"SEDICYL" is a new preparation introduced by the Joachim Wiernik Co., Berlin, and stated to be an ester preparation of cholin. In an address to the German South-West Gynæcological Society at Baden, Baden, in October 1929, Dr. C. Werner of the Clinic for Women, Freiburg University, dealt with its use in the climacteric. As is well-known, the chief action of cholin is to reduce blood pressure, and the speaker claimed that "Sedicyl" is of value in relieving the attacks of flushing, headache, perspiration, vertigo, etc., associated with the climacteric. The administration of the drug in doses of one to two tablets three times daily was not followed by any toxic symptoms, whilst patients who were suffering severely from climacteric disturbances were promptly relieved of their principal symptoms. The British agents are Messrs. Coates & Cooper, 41, Great Tower Street, London, E. C. 3.

MAGNESIATED PEPTALMINE.

A RECENT book published in French by René A. Gutmann reviews the symptoms and signs of chronic cholecystitis. He states that the pain, which is situated in the right hypochondriac area, is as a rule of only moderate intensity, but in more severe cases there is reflex gastric disturbance associated with vomiting and a condition which may be termed "chronic dyspepsia"; in fact such a condition is more characteristic of cholecystitis than is gall-bladder pain. By way of treatment he advocates cholagogues and drugs which produce an effective drainage of the gall-bladder. Amongst these he mentions Magnesiated Peptalmine, a product of the Laboratorie des Produits Scientia, Paris, which is stated to contain desiccated peptones and sulphate of magnesia, thus ensuring a gradual evacuation of the bile and an alleviation of the gastric symptoms. The Indian agents for this product are Messrs. G. Loucatos & Co., P. O. Box No. 2239, 12, Dalhousie Square, Calcutta.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

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Original Articles.

THE TREATMENT OF CHOLERA WITH BACTERIOPHAGE.*

By IGNOR N. ASHESHOV,

SARANJAM KHAN, B.SC., M.B., B.S., D.P.H., D.T.M. & H.,

and

M. N. LAHIRI, M.B.

[From the Bacteriophage Enquiry, Indian Research Fund Association, Bankipore (B. and O.), British India.]

ASIATIC cholera is an acute disease running its course with extraordinary rapidity. It is quite common in cholera to see many a healthy man doing his normal work in the evening who passes the first stool in the morning and is dead within the next 24 hours. This rapid course of the disease is the most important factor to be reckoned with in the treatment of Asiatic cholera. We are of the opinion that the so-called early or the mild cases of cholera are entirely unsuitable for determining the efficacy of any treatment. Statistics based on the "cures" of such cases are worthless. So we have excluded such cases from our consideration. We shall deal with the treatment of cases of fully developed true Asiatic cholera. These are the cases who are admitted already in a collapsed condition or who fall into collapse within 6 hours of admission.

Again, it must be emphasised that we do not contribute to the view ordinarily held that the symptoms are largely or entirely due to the loss of fluid from the body. We do not propose to discuss experimental laboratory evidence in favour of our view because that would carry us out of the scope of this paper. We are, however, convinced by our clinical experience alone, that in cholera we are dealing with cases of a disease the victims of which suffer from obvious symptoms of severe intoxication. It is also beyond the scope of this paper to enter into the controversy regarding the nature of the toxins responsible for the syndrome of cholera. But there is no doubt that the patient suffering from cholera is evidently suffering from the effects of a very potent poison.

We also believe that Asiatic cholera is caused by an infection with the *Vibrio choleræ*, the classical vibrio of Koch. Whether the toxins which cause the syndrome of cholera are derived from the bodies of the vibrios or from the tissues of the host we do not propose to discuss, but their action coincides with the infection with the *V. choleræ* and their active multiplication in the intestine of the patient. We are, therefore, confronted with two important problems in the treatment of cholera. The first is to destroy the vibrios, to stop or inhibit their multiplication in order to prevent further damage. The second is to undo the mischief that has already been done, to eliminate the toxins already present, to enable the system to pass over the collapsed stage in order to recover from the initial shock it has received from the poison already absorbed. Bearing in mind the rapid course of this disease our remedy must be such as to bring about these results in the shortest time possible.

With regard to bacteriophage we know that a small quantity of it destroys a very large number of cholera vibrios *in vitro* in less than 2 hours and, as it destroys them, it regenerates itself and grows at their expense. This quality of the bacteriophage makes one expect it to be the ideal remedy for the treatment of cholera inasmuch as it is entirely harmless to man and can be taken in incredibly large doses.

Our preliminary work on the study of bacteriophage enabled us to prepare a sufficiently potent cholera bacteriophage, which we used in the treatment of patients admitted into the cholera ward of the Patna Medical College Hospital during the cholera season of 1929.

The results showed that in bacteriophage we have a promise of a very potent remedy for the treatment of cholera. The results should be as good or even better in the hands of everybody as a bacteriophage can now be obtained which is even better than that we used in 1929.

We ourselves could hardly believe our own results. It certainly is a remarkable statement to say that the mortality from cholera by our method of treatment was reduced almost to nil. But this is what our results showed. We have never come across such striking results in the treatment of cholera obtained by any other method previously. And when we say cholera, we mean by it a severe attack of virulent true epidemic Asiatic cholera; the patient being pulseless and severely collapsed, passing in his stools the true cholera vibrio in almost pure culture. To reduce the mortality in such cases to about nil is certainly remarkable.

Our results can be summarised as follows:—For comparison we give also the results obtained in the same hospital during the same epidemic but without our methods being applied. At that time we were only observing the cases without treating them.

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		Per cent.
The total number of cases treated in the cholera ward *before* we took it over ..	24	
The total number of deaths amongst them	5	21
The number of bacteriologically proved cases of cholera amongst them ..	16	
The number of deaths amongst those 16 cases	4	25
The total number of cases treated in the cholera ward *after* we took it over ..	266	
The total number of deaths, disregarding the actual cause, amongst them pneumonia, toxæmia, post-partum, typhoid fever, leprosy, etc.	18	7
The number of cholera cases proved bacteriologically	140	
The number of deaths amongst those 140 cases (excluding those who died within 2 hours of admission, i.e., where no therapeutic intervention could have any effect)	4	2.8

The principles which we applied in the treatment of cholera were very few, but were strictly observed. They were as follows:—

1. The treatment of the patient must begin as soon as possible, without any delay.

2. To get the best results we cannot rely on bacteriophage alone. We mentioned above that our bacteriophage destroyed vibrios in less than 2 hours, *in vitro*, where from the very beginning bacteriophage is brought in close contact with the vibrio. It is different in the body. There we can introduce bacteriophage in two ways:—

(*a*) *By the mouth.*—Although in the case of cholera the peristalsis is usually very energetic yet it takes a considerable time for bacteriophage to reach every vibrio in the intestines and to destroy them.

(*b*) *By the intravenous route.*—It has been proved by animal experiments that bacteriophage has a definite predilection for the intestinal tract, it was also proved that bacteriophage possesses a definite bacterio-taxis, that is to say, it moves quickly in the direction of bacteria sensitive to its action. Therefore, in case of intravenous injection bacteriophage quickly directs itself towards the intestines and comes in contact with the vibrio quite soon. But we must not forget that bacteriophage does only one thing: it destroys living cholera vibrios, but neither neutralises the toxin already present in the body, nor cures the lesions produced by vibrios and their toxin.

Therefore, we must definitely understand the rôle of bacteriophage: sooner or later it stops the further activity of vibrios in the body. To neutralise the damage already done we must use other methods which will help to eliminate the toxin from the body, will support the heart action and will provide the necessary amount of liquid to the dehydrated tissues of the body. Such a method *par excellence* is the saline *alkaline* intravenous injection which, therefore, must be used along with administration of bacteriophage.

3. No antiseptics like calomel, potassium permanganate, essential oils, etc., or absorbents like kaolin must be used. Bacteriophage is a living being and cannot act properly in the presence of antiseptics. Kaolin, etc., absorbs bacteriophage also and prevents its reaching the vibrios.

We shall now describe the details of our method of treatment under two headings, viz., (1) the use of intravenous saline, and (2) the administration of bacteriophage.

(1) *The use of intravenous saline.*

At the outset it must be mentioned that our method of intravenous saline is a modification of that originated by Sir Leonard Rogers.

We consider it very important that the saline to be used intravenously shall be properly prepared and sterilized. We have made it a rule to prepare it under our own supervision. Its preparation should not be entrusted to nurses or the compounders. We prepare the saline in two parts, one is hypertonic and the other isotonic, the latter is used for the preparation of the alkaline saline. For the hypertonic saline Erlenmeyer's flasks of 2 litre capacity are used. Owing not only to the varying degree of hardness in the water but also to other reasons, we consider it important to use distilled water always. For the preparation of the saline we use only sodium chloride and no other ingredient, the strength of the hypertonic saline being 120 grains of sodium chloride in a pint of distilled water, and of the isotonic saline 60 grains of the salt in a pint of distilled water. We have found that the addition of calcium and potassium chlorides, originally recommended by Sir Leonard Rogers, has no advantage. Tablets of sodium chloride containing calcium are on the market, but the saline made with them becomes turbid when alkali is added to it. We have, therefore, abandoned the use of these tablets in favour of the sodium chloride without any other ingredient. After the salt is dissolved in the distilled water the saline is filtered through a filter paper: three pints of the hypertonic and one pint of the isotonic saline are then placed in a two-litre and one-litre flasks respectively. The flasks are plugged with plugs of gauze instead of cotton-wool to prevent fibres of cotton-wool dropping inside them. They are then sterilized in the autoclave for 30 minutes at 120°C.

Saline in this way can be prepared beforehand and kept ready for the expected number of cases. Sterilization at this temperature prevents the growth of moulds and the saline, if kept protected from dust, may be used after several weeks of storage.

The saline must be sterilized in the autoclave. We have found that sterilization under pressure is essential. It is not desirable that the saline for intravenous use be sterilized by

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boiling. The dissolved air driven off by boiling renders the saline less efficacious and perhaps even makes it dangerous if used intravenously. We want to draw special attention to this detail as this has not been noted in the literature before. Some of the failures of the intravenous saline are the result of want of attention to this detail.

The alkaline saline is prepared from the isotonic saline. It is not desirable to heat sodium bicarbonate in solution with sodium chloride. Sodium bicarbonate is weighed in 160 grain portions, put in paper packets and sterilized in a glass jar also covered by paper in the autoclave at 120°C. in such a way that they will not be damaged by condensing water. Just before use one of the powders of the sterilized sodium bicarbonate is dissolved in a pint of the sterilized isotonic saline. This is the alkaline saline. A glass funnel of suitable size with a filter paper is wrapped in a paper and sterilized in the autoclave. The alkaline saline is filtered through the filter paper into a graduated flask from which it is run into the vein.

For giving the saline intravenously very few extra instruments are required. It is not necessary to purchase the cholera outfits that are in the market. A few graduated funnels with rubber tubing of suitable length and calibre and several silver cannulæ of small and medium sizes provided with stopcocks should be obtained, such as those recommended by Sir Leonard Rogers.* The funnels with rubber tubing and a cannula assembled are wrapped in a towel and paper and then sterilized in the autoclave at 120°C. for 30 minutes. A number of them may be thus kept ready for use when required.

The saline injections must be used rationally, and their application guided by the specific gravity of the blood of the patient. To measure it the usual water and glycerine mixture in bottles must be prepared fresh. Owing to age the mixture in the bottles supplied with some of the outfits is useless. It is essential to have suitable areometers registering specific gravity from 1050 to 1080. About 8 small elongated bottles are required. Glycerine and distilled water are mixed in a cylinder and the specific gravity is read with the areometer. By addition of more glycerine or distilled water, mixtures of the following specific gravities are prepared—1056, 1058, 1060, 1062, 1064, 1066, 1068, 1070. Each mixture is placed in one of the bottles and labelled. Carbolic acid should be added so as to make its strength in the mixture about 2-5 per cent. This prevents the growth of moulds. The mixture should be made fresh as often as necessary. The specific gravity of the mixture should be checked frequently, about once a week. In the rainy season due to the absorption of moisture by glycerine it should be checked even twice a week.

For finding the specific gravity of the blood, the finger is pricked with a needle and the drop of blood is sucked up with the help of a rubber teat into a thin glass pipette. It is very important to take special care not to suck into the pipette any air with the blood. The drop of blood is then released in the *middle* of the glycerine mixture. Special care again is taken not to discharge air bubbles with the blood. Supposing we release the drop of the blood in the middle of the mixture of specific gravity 1068 and we find that it floats, then the specific gravity is less than 1068. But if the drop sinks the specific gravity of the blood is more than 1068. The drop should begin to sink as soon as it is released from the pipette, because even the drop that has risen up previously will begin to sink after the lapse of a very short time.

On admission the degree of the collapse from which the patient is suffering should be ascertained. The use of the sphygmomanometer is helpful but is not indispensable. Feel the radial pulse and see whether it is still perceptible (though it may be very thin and weak) or not perceptible at all. In both these instances immediate intravenous saline will probably be required. It is worth while to feel the radial pulse of both wrists as it may be imperceptible on one side on account of abnormality which, to our surprise, we met with quite often.

Take the specific gravity of the blood always! This is important. If the specific gravity is below 1058, the patient usually does not yet require an intravenous saline. Patients are, however, not infrequently encountered, especially those who have already had intravenous saline, whose pulse is so weak that judging by the pulse alone one would order an immediate intravenous saline. But on seeing the specific gravity of the blood it is found to be very much below 1058. Now in some of these cases the administration of an intravenous saline is known to have disastrous results due to heart failure. We, therefore, never give an intravenous saline without first ascertaining the specific gravity of the blood and the condition of the heart. Finding the specific gravity of the blood does not take more than a minute. In such cases the intravenous saline is withheld for the time being, and every effort is made to improve the pulse by strengthening the weak heart. We have found that the intravenous or subcutaneous administration of 1/250 grain of strophanthin is very beneficial in bracing up the heart. This is our routine in treatment of the failing heart in cholera. The subcutaneous administration of 10 c.c. of 10-20 per cent. camphor in oil is also helpful.

Because in cholera several pints of saline are to be administered it is much better to

*Supplied by Messrs. Smith Stanistreet & Co., Ltd., Calcutta.

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cut down on the vein. Finishing off the flow of several pints of saline into a vein by a prick of needle through the skin may be successful in some instances, but it is usually fraught with difficulties. We, therefore, as a routine cut down upon the vein. Any prominent vein of good size may be chosen. The veins in front of the elbow usually suffice in most cases. No anæsthesia is required for the trivial operation. The vein is made turgid by tying a piece of bandage cloth on its proximal side. The skin incision should be made parallel with the vein but not directly over it. With the thumb of the left hand pull the skin over the vein to one side and holding it there incise through it with the knife. The skin and the subcutaneous tissues are incised with a single sweep of the knife. When the skin is released the incision in it comes to lie directly upon the vein which shines a distinct blue colour and is directly in view. Very little further freeing of the vein will be necessary if all the subcutaneous tissue has been cut by the first incision. A director is placed under the vein and two catgut ligatures are passed underneath it. The distal ligature is tied over the vein and cut short. Next pour the hypertonic saline into the graduated funnel and let it run through the cannula to ensure that the flow is unimpeded and all air has been driven out. This is a very important detail. Every care should be taken to ensure that there is no air in the tubing. Fill the graduated funnel early to allow time for the fluid to fill the tubing completely. Then let a good deal of the saline run from the cannula. Air will be noticed squirting out, so continue to run until there is no more squirting of the air and the flow becomes a continuous regular stream. Now close the stopcock of the cannula. The graduated funnel must be held on a stand. Avoid changing its height because this may let air get into the vein. Hold the front wall of the vein with fine forceps and snip the vein with sharp scissors. Open the stopcock of the cannula and let some of the saline run out of it again, then introduce the cannula through the flap-like incision into the vein *while the saline is still running out of it.* By doing so the running saline washes the blood oozing from the rent of the vein, admitting a clearer view of it and at the same time prevents air from being driven into it. Do not loose the hold on the vein with the forceps until the cannula is introduced.

When the cannula is in the vein, tie it in the vein with an incomplete surgical knot of the proximal catgut ligature which was previously passed under the vein. If the graduated funnel is now filled with saline up to the top the downward flow can easily be seen in the narrow neck of the flask, if it is going freely into the vein.

The amount of saline to be given intravenously should be arrived at with discretion, paying attention to the condition of the heart, the lungs and the specific gravity of the blood. As a rule we give to all adult patients three pints of the hypertonic saline, and finish it off with an additional pint of alkaline on the first sitting. We seldom give more than four pints of hypertonic and one pint of alkaline saline at a time, and that also we give only in cases of very high specific gravity of the blood of about 1068 or over. If the specific gravity of the blood is below 1058, but the patient is pulseless, defer intravenous saline and try to brace up the heart with 1/250 grain of strophanthin hypodermically, or 10 c.c. of camphor oil also given hypodermically. If the patient still remains pulseless intravenous saline may be given but in small amounts not more than 2 to 3 pints in all. For children, of course, the amount of saline to be given intravenously will be varied as the case may be. If the patient collapses again after a previous saline and the specific gravity is not unusually low, showing the weak pulse to be due to heart failure, we do not hesitate to give another intravenous saline as many times as necessary, though the amount of saline may now be reduced (2 to 3 pints in all). The alkaline saline may however be omitted in order not to overdose the patient with alkali. If you are not sure that the failing pulse is due to a week heart, give the benefit of doubt in favour of saline and give saline even if the specific gravity is below 1058. When about 10 to 15 ounces are run in and the pulse improves, 2 to 3 pints in all can then be confidently given with very beneficial results. *If, however, the pulse does not improve stop the saline.*

The temperature of the saline to be given intravenously should receive special attention. We never give the saline at a temperature higher than the normal body temperature (98.4°F.). We have never had an occasion to regret having given it even at a lower temperature in all cases irrespective of the rectal temperature. On the contrary we have had disastrous results by using intravenously even slightly warmed saline. In countries where cholera is prevalent the room temperature will in almost all cases be found to be adequately warm for such purposes.

During the course of the administration of saline intravenously there is often severe shivering. It may occur earlier with cold saline but we have never considered such shivering to be of much consequence. It usually passes off quickly without untoward results.

As to rapidity of the flow we think it to be very important and must be carefully looked to. Three pints in 45–60 minutes is quite a good rate, because the vaso-constriction often sets in at about this time, rendering the flow slower and difficult. But the flow should not be accelerated for fear of the vaso-constriction. *The rate of an ounce a minute should rarely*

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be exceeded. After the saline is finished and the cannula is taken out of the vein, the incomplete surgical knot is tightened, completed and cut short. After the application of iodine the skin incision is closed by one or two sutures of silkworm gut. The wound is dressed and bandaged.

Every cholera patient must be watched constantly from the time of admission until he is out of danger. The temperature should be recorded every hour for six hours after the intravenous saline. One ought to be on special guard against hyperpyrexia. If the body temperature tends to rise above 103°F. it should be kept down by cold sponging and an ice cap.

If the nursing is satisfactory and the patient is seen frequently, an attendant being always present, hot water bottles may be used with great benefit during the initial collapse and the shivering stage of the intravenous administration of saline. During the reaction stage the hot water bottles should be removed. During the first 24 hours intravenous saline may be needed repeatedly even 2 hours after the previous one. It is very important indeed to watch the patient constantly night and day until discharged. A dangerous collapse may occur even on the 5th or 6th day of the disease. Besides there is always the danger of uræmia.

With the intravenous use of alkaline saline the danger of uræmia will largely be averted. After the acute stage is over, in a certain proportion of cholera cases uræmia will still have to be reckoned with. During convalescence, measuring the amount of urine passed in 24 hours is of considerable value. If 2 pints of urine are passed in 24 hours the patient is most probably out of danger. But if, however, the quantity of urine passed in the 24 hours is inadequate, the patient should be carefully watched for any signs of uræmia—which usually manifest themselves early in the shape of mental confusion, dullness and restlessness. On the approach of these early signs *an intravenous administration of a pint of the alkaline saline* usually wards off an attack of fatal uræmia. With the use of the alkaline saline in this manner, uræmia has ceased to be of much concern to us.

We have found that the use of sodii bicarbonas by the mouth and dry cupping of the kidneys is of real help in establishing free flow of urine.

(2) *Bacteriophage.*

The administration of bacteriophage is very simple indeed. Our bacteriophage is stocked in 50 c.c. bottles and in 5 c.c. glass ampoules. On admission one of the bottles containing 50 c.c. of the bacteriophage is placed near the patient. He is given bacteriophage by the mouth in about drachm doses every 30 minutes. The bacteriophage is given undiluted and sipped directly from the bottle. It is an almost tasteless and odourless clear fluid. When taken in those doses by the mouth it is usually retained and does not induce vomiting. If a dose is vomited due to the usual vomiting of cholera, it may still be given undiluted as usual. If, however, it is believed that the vomiting was induced by the dose of bacteriophage then it should be given in smaller sips. Two bottles of bacteriophage each containing 50 c.c. of the bacteriophage will thus be finished in the following 16 hours. After the first 24 hours of admission a bottle in 24 hours for the next 48 hours will usually suffice.

It will be seen that in this manner an enormous amount of bacteriophage has been given to the patient. We have found the bacteriophage to be entirely harmless. It can be taken *ad libitum.*

If the bacteriophage is given intravenously there is evidence to show that it appears much more quickly in the stools, than when given by mouth. There is also evidence to show that there is a kind of chemotaxis between the bacteriophage and the micro-organism susceptible to its action. Due to this property the bacteriophage present in the blood stream is attracted to the micro-organisms susceptible to its action and in the case of cholera the bacteriophage, given intravenously, is concentrated in less than 2 hours in the intestines—the site of the proliferation of *V. choleræ.*

We, therefore, give bacteriophage by the intravenous route also. In this case, however, we do not give more than 5 c.c. of the bacteriophage and that very considerably diluted, because there is the possibility of anaphylactic shock on account of the foreign proteins present in the broth used for preparation of bacteriophage, although we have never had any such misadventure. Apart from this, as our experiments on guinea-pigs have shown, the bacteriophage by itself has no toxic action at all. The only safe way to administer bacteriophage intravenously is to give it along with the saline. Used in this way it never produced any reaction. A five cubic centimetre ampoule of the bacteriophage is broken and the contents poured into the hypertonic saline and thus given intravenously with it.

Intravenous or subcutaneous injections of undiluted bacteriophage should never be given as they are liable to produce definite anaphylactic shock, of passing but rather unpleasant character.

We have no experience of the effects of administering bacteriophage per rectum. We have not tried this method so far and we are, therefore, not in a position to express any opinion about it.

After the administration of bacteriophage the stools rapidly become free from *V. choleræ.*

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Most of the vibrios are destroyed and the few that escape are usually of atypical kind. It appears that they lose their pathogenic power. At the same time there is marked improvement as regards the diarrhœa. The stools become less frequent, less abundant, contain fewer flakes and rapidly become fæcal in nature. With the improvement as regards diarrhœa further necessity for an intravenous saline does not arise. As the diarrhœa lessens there is rapid improvement in the general condition of the patient. It is remarkable how soon very good appetite returns. With the bacteriophage the recovery is very much quicker than without it. The period of convalescence is considerably shortened. In about 3 or 4 days' time the patient is much better and asks for permission to go home.

The bacteriophage is the only remedy we give internally. The patient is given cold water to drink *ad libitum*, only care is taken not to give it in unusually large quantities at a time in order to prevent unnecessary vomiting. Ice may be given freely to be sucked.

All other drugs are avoided. No potassium permanganate is given in water or in pill form. Essential oils, camphor, calomel, etc., are not used at all.

No food is given for the first 48 hours. If after this there is satisfactory improvement barley water and whey or fruit juices may be given. If these do no harm and the diarrhœa improves milk may be allowed. Then semi-solid food and finally ordinary diet. Unnecessary prolonged fasting enhances the acidosis and should be avoided in cases with a tendency to uræmia.

A word of warning about the cholera bacteriophage should be given here. It is necessary that the bacteriophage should be of the highest virulence possible. Besides, it is also very important that it should have a very wide range of action. The bacteriophage we have been able to produce so far is of high virulence and its range of action is fairly wide, that is to say it destroys all the strains of *V. choleræ* we have met with up to now in the epidemics in various parts of India. Its range of action, however, is not extensive enough to complete our satisfaction. We cannot deny the possibility of coming across strains of cholera which are not acted upon by our bacteriophage. Several such examples we encountered previously during the car festival of Jagannath in Puri. In such cases of course the beneficial results of the bacteriophage are wanting. We hope, however, to surmount these difficulties, as our technique for the preparation of bacteriophage improves. We hope to prepare a highly virulent bacteriophage that will attack all the strains of *V. choleræ* met with throughout India.

A PLEA FOR THE LOWER UTERINE SEGMENT CÆSAREAN SECTION.*

By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P., (Lond.), F.C.O.G.,

LIEUTENANT-COLONEL, I.M.S.,

Professor of Midwifery and Gynæcology, Calcutta Medical College, and Surgeon to the Eden Hospital for Women, Calcutta.

IN 1925, during a surgical visit to America, I saw Professor de Lee doing the operation in Chicago of which he is the sponsor. I was immediately impressed by the importance of this operation to India for, as you are aware, antenatal care is only in its infancy in this Peninsula and as a result dire obstetric difficulties are not realized until the patient has been long in labour with the result that the woman is not taken to hospital until her life and that of the baby are in danger, and certainly not before she has had multiple examinations.

On returning to India I at once began to teach and perform this operation. Since 1925, 75 lower uterine Cæsarean sections have been performed at the Eden Hospital and in private practice, and of the hospital patients 48 arrived late in labour after many examinations had been made outside, and in 28 the membranes had ruptured.

Out of the 75 cases there were 11 maternal deaths and 10 fœtal deaths—3 of these were stillborn and 7 died within a few days. This mortality may seem excessive, but when you consider that 48 of the cases were essentially septic at the time of operation, and that 62 per cent. had been in labour for many hours, I think you will agree that these statistics are worthy of your serious consideration; for only a few years back a large proportion of these septic cases would have been treated by craniotomy or by the older method of classical Cæsarean section with complete eventration of the uterus. I have been associated with the Eden Hospital now for 20 years and can well remember the disastrous results to mother and baby of this eventration operation and, I can assure you, that before the War 50 per cent. of the mothers who suffered this operation, after they had been hours in labour and were septic due to multiple examinations or trauma, died of general peritonitis due to the spill of septic contents of the uterus into the peritoneal cavity.

Nobody is more aware than I am that a mortality of 11 out of 75, that is, 14.66 per cent., is grievous, but until such time as we can induce patients to come to hospital early, or can rely on efficient antenatal supervision, maternal mortality due to obstructed labour must remain great in India.

* Being a paper read at the Medical and Veterinary Research Section of the Indian Science Congress held at Nagpur, January 1931.

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The point which I want to impress upon my audience is that the operation of lower uterine segment Cæsarean section, with a view to conserving the life of the mother and child, is far less dangerous and attended with far less mortality than is that of craniotomy, and that this fact is not yet realized in obstetric hospitals in India.

To prove this my Registrar, Dr. K. Dutta, has analysed a consecutive series of 104 craniotomies in the Eden Hospital. He finds that there were 34 deaths, that is, a maternal mortality of 32.69 per cent. These craniotomies were done when the fœtus was dead and the patient had been in labour for days or many hours. Now if such is the death rate for craniotomy done by an expert staff under the best conditions, how much greater must be the death rate when this operation is done in a private house under horrible conditions, for all these women die from acute or chronic puerperal sepsis associated with hæmorrhage and shock. I think, therefore, you will agree that an operation which gives a fœtal death rate of 10 out of 75 (i.e., 13.33 per cent.) and a maternal death rate of 11 out of 75 (i.e., 14.66 per cent.) has much to recommend it in India until such time as antenatal propaganda and supervision become generalized. I will not weary you with the steps of the operation but I should like to state that sometimes I use Professor de Lee's vertical incision through the lower uterine segment and sometimes the transverse incision of Professor Hendry of Glasgow.

Advantages of this operation.

(1) It can be done late in labour—either late in a "test" labour or when the patient is seen after many examinations have been made or forceps have been applied unsuccessfully; provided the fœtal heart sounds are audible and over 100 in rate.

(2) The mortality and morbidity of this operation are less in a late case than that of a classical Cæsarean. The reason for this is that the incision heals better because it is not in a contractile portion of the uterus; but in the lower uterine segment which is at rest. The reasons for this are:—(*a*) The incision is fully covered over by the peritoneum which is an important barrier against infection. (*b*) The lower uterine segment resists infection better than the fundus, because of the presence of a large number of macrophages or "guardian cells" which exist beneath the peritoneum in the broad ligament. (*c*) The stitches used are of catgut and need not be pulled tightly, because they are used merely for the approximation of the wound's edges, and not for hæmostasis as in the classical incision.

(3) There is very little hæmorrhage and practically no shock after this operation; the complete operation, from start to finish, in my hands, has never taken more than half an hour.

(4) There is practically no risk of secondary rupture of the scar, whereas 4 per cent. of secondary ruptures occur after the classical operation.

(5) In many of our cases where the liquor amnii was stinking we were able successfully to drain the operation area with a tube introduced into each lateral sulcus of the lower abdomen supra-pubically.

(6) The *bien être* of patients after this operation is remarkable. They do not have that distension, vomiting and exhaustion so frequently following the classical operation.

(7) The maternal mortality with this operation in Chicago is under 2 per cent. It is to be sincerely hoped that our statistics may improve. That this is possible there can be no doubt, for the author has done 11 cases in private without losing a mother or child and, moreover, all the clean cases in hospital have also survived, namely, 16 in all, that is, *there have been no maternal or fœtal deaths in* 27 *clean cases; the remaining* 48 *being highly septic, provided the* 11 *maternal deaths and* 10 *fœtal deaths.*

The data and statistics as regards the parity, age and the operation indications are included in the accompanying table, for which I am much indebted to my Registrar, Dr. K. Dutta.

Note.—During the 5 years period under consideration my Registrar informs me that there have in addition been 29 classical, 11 McCann, and 8 Porro-Cæsarean sections performed in the hospital with a maternal mortality of 18.7 per cent. and a fœtal mortality of 31.2 per cent. But a great number of these patients were already septic before operation and these operations were performed by other members of the staff perhaps not persuaded at the time of the advantages of the lower uterine segment Cæsarean operation. I believe their conversion is imminent—at least in all cases definitely or potentially septic on whom urgent Cæsarean section, to conserve both the life of mother and child, is imperative.

The lower uterine segment Cæsarean operation.

Results.

Number of Cases.	Mothers.				Child.					
	Cured.	Per cent. Cured.	Deaths.	Per cent. of Death.	Alive.	Per cent. Alive.	Died.	Per cent. Died.	Stillborn.	Per cent. Stillborn.
75	64	85.33	2	14.66	67	89.33	7	9.33	3	4.00

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Indications.

	Number.	Cured, mother.	Death, mother.	Death, child.	Stillborn.
Contracted pelvis ..	40	33	7	6	2
Abnormal presentation	3	1	2	2	1
Post-maturity ..	12	12	..	..	..
Atresia vagina and rigid cervix ..	7	7	..	2	..
Osteomalacia ..	8	8	..	1	..
Impacted twin ..	2	1	1	..	..
Procidentia ..	1	..	1	..	1
Old multipara ..	2	2	..	..	..

Parity.

Parity.	Number.	Deaths.		
		Mother.	Child.	Stillborn.
1st ..	45	5	2	4
2nd ..	14	3	..	..
3rd ..	9	1	..	1
4th ..	4	..	..	1
5th ..	..	..	..	..
6th ..	..	..	..	..
7th ..	2	2	1	1
8th ..	..	..	..	..
9th ..	1	..	..	..

Age.

Age.	Number.	Deaths.		
		Mother.	Child.	Stillborn.
14 to 20 years.	30	4	5	2
21 to 30 years.	38	6	2	..
31 to 40 years.	6	..	..	..
41 to 42 years.	1	1	..	1

FŒTAL ASCITES.*

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and
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ON account of their rarity and clinical importance, we venture to record the following two cases.

Case No. 1.

Post-mortem findings.—Baby A., male, weight 4 lbs. 14 ozs., length 16 inches, appeared normal and fairly well developed in external appearance. Abdomen:—protuberant, flanks bulged out, shifting dullness and fluid thrill were both present. Genital organs showed no abnormality. Anus patent, admitting the tip of the little finger. There was no evidence of subcutaneous œdema in any part of the body. On opening the abdominal cavity about 10 ozs. of slightly yellowish, clear fluid was drawn out; no flakes of lymph were found. The peritoneum as well as omentum were smooth and glistening everywhere. Coils of intestines were free. Liver, normal, capsule smooth. There was no evidence of portal obstruction which was particularly looked for. Spleen—normal. Kidneys and adrenals—normal, the former presenting a lobulated appearance. Bladder was not distended and contained only 6 c.c. of clear urine. Placenta weighed 2 lbs., looked big and œdematous, cotyledons friable and shaggy; cord 19 inches in length also œdematous, and friable, was attached marginally to the placenta. There was no fluid either in the pleural or pericardial cavities. Heart and lungs showed no abnormality.

Histological findings.—Liver, spleen, kidneys and suprarenals showed normal appearances, except for the presence of numerous leucocytes and hæmorrhages in some areas within the connective tissues; capillaries were engorged. This was specially marked in the liver. Peritoneum showed no sign of inflammation. Heart, lungs and thyroid showed a normal appearance. The skin and subcutaneous tissue did not show any œdematous changes. The placenta and cord showed evidence of œdema. Sections stained for *Treponema pallidum* (Levaditi's method) gave negative results. Sections stained for bacteria (MacCallum's method) showed none.

Chemical examination of the fluid.

Quantity ..	10 ozs.
Colour ..	clear pale yellow.
Sp. gr. ..	1015.
Albumen ..	copious.
Sugar ..	nil.
Bile pigments ..	present.
Bile salts, acetone and sediments.	Di-acetic acid—absent, a fair number of R.B.Cs. and a few pus and endothelial cells.

Rivalta's test positive.

Cytological examination of the fluid.

	Per cent.
Polymorphonuclears ..	.. 50
Lymphocytes ..	.. 40
Endothelial cells ..	.. 10

Culture of the fluid—sterile.

Obstetric history of the mother.

Mrs. A., Hindu, Bengali, æt. 26, 3rd para: admitted with a history of 8 months amenorrhœa and swelling all over the body. Examination on admission: vertex presenting, cervix

* Being a paper read at the Medical and Veterinary Research Section of the Indian Science Congress, held at Nagpur in January 1931.

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PLATE I.

Fig. 1.
Case 1.—General appearance of the fœtus showing the well-marked ascites and œdematous condition of the cord.

Fig. 2.
Case 1.—Photomicrograph of liver showing engorged capillaries and hæmorrhagic areas (low power).

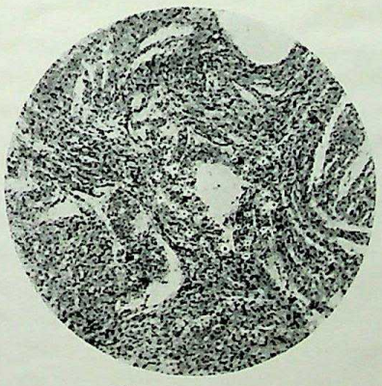

Fig. 3.
Case 2.—Photomicrograph of the heart showing (*a*) hæmorrhage between the muscle fibres, and (*b*) congested capillaries (low power).

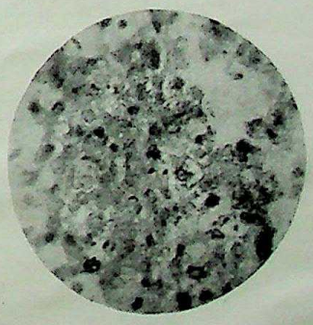

Fig. 4.
Case 2.—Photomicrograph of a hæmorrhagic area of the heart muscle (high power) showing megaloblasts, leucocytes, and red corpuscle infiltration.

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fully dilated, head low down. Fœtal heart sounds not heard. Urine loaded with albumen. Blood pressure $\frac{175}{140}$ mm. Hg. Pulse 100, resp. 22 per minute, temperature 97°F. She was delivered of a dead fœtus within half an hour of admission without any artificial aid.

Previous history.—First baby born at full term but died of tetanus, a fortnight after birth. Second baby 1 year ago born at 8 months, died 2 hours after birth. Puerperia on both occasions were uneventful.

Blood.—Hb. 55 per cent., R. B. Cs. 3,600,000, W. B. Cs. 12,000, polymorph. 75 per cent., small mono. 22 per cent., large mono. 7 per cent., eosin. 1 per cent. No malaria parasites seen. Anisocytosis was present. Wassermann reaction negative. Chopra and aldehyde tests for kala-azar were negative.

Urine.—Sp. gr. 1018. Albumen present, 25 per cent. Sugar a trace only. Bile, acetone, di-acetic acid and phosphates—*nil.*

Microscopically.—A few pus cells.

N.B.—Evidently the mother suffered from albuminuria of pregnancy complicated with a moderate degree of anæmia.

Case No. 2.

Post-mortem findings.—Baby S., male, weight 6 lbs. 7½ oz., 17 inches in length corresponding in development to a 9 months' fœtus.

Extremities well developed. All the signs of free fluid in the peritoneal cavity were present. No evidence of subcutaneous œdema anywhere in the body. Genital organs quite normal. On opening the abdominal cavity about 300 c.c. of straw-coloured fluid escaped. No flakes of lymph present. The peritoneum, both visceral and parietal, was smooth and glistening. The intestines were free from adhesions, the large intestine contained meconium. The bladder contained only a few drops of clear urine. Placenta 14 oz., normal, did not look œdematous. Cord 17 inches long, was inserted marginally to the placenta.

Histological findings.—Liver, spleen and kidney showed normal appearance except for some areas of hæmorrhage within the internal organs. Megaloblasts were seen in the liver and spleen within the blood vessels. Heart—(*i*) there were areas of hæmorrhage, large and small, in between the muscle fibres, (*ii*) megaloblasts were seen in fair number, leucocytes were numerous, polymorphonuclears predominating.

Obstetrical history of the mother.

Mrs. S., Hindu, Bengali, æt. 24, 4th para: admitted in pains; labour lasted 12 hours 40 minutes, the second stage lasting only 15 minutes. Baby lived only for 1 hour after birth. Examination on admission: vertex presenting, head low down, cervix fully dilated, membranes were intact and were ruptured artificially followed by immediate delivery. Presentation was left occipito-anterior. Previous labours—normal.

Urine.—Clear.

Blood.—Hb. 50 per cent., R. B. Cs. 3,250,000, W. B. Cs. 25,000, polymorph. 88 per cent., small mono. 8 per cent., large mono. 2 per cent., eosin. 2 per cent. No malaria parasites seen. Chopra and aldehyde tests were both negative. Wassermann reaction negative.

N.B.—Moderate degree of anæmia in this case also is evident.

Review of Literature.

A single case of general fœtal dropsy is found in one of the two cases which represent the only clinical records of individual instances of the occurrence of fœtal disease and deformity in the Hippocratic writings. Albucasis (936-1013 A.D.) recorded a case of dystocia due to accumulation of fluid in the fœtal thorax and abdomen. Jacques Guillemeau (1550-1613) in his works described cases of fœtal ascites. Portal (1703) noted a case of fœtal ascites with distension of bladder. Philippepeu (1703) wrote on fœtal hydro-thorax and ascites. Guillaume Mauquest de la Motte (1655-1737) described cases of labour complicated by ascites and inflammatory peritoneal effusion. Mauriceau (? 1709) who was himself a subject of fœtal disease described cases of fœtal ascites, variola and syphilis. Levret (1703-1780) recorded a case of fœtal ascites. Galetti (1778) also described specimens of fœtal ascites and hydro-thorax. Later, notably among many others, Hohl of Halle, Virchow, Fordyce, and Ballantyne all wrote on fœtal ascites, but to Ballantyne credit is due for the most painstaking accounts of antenatal pathology and fœtal diseases.

A pure form of fœtal ascites has been seldom observed. It has been found most commonly as general fœtal dropsy associated with hydrothorax and sometimes with the dropsy of the mother. Large quantities of free fluid have occasionally been found in the macerated fœtuses.

As to the causation of the disease the following have been enumerated by various authors:—(1) Obstruction to the portal circulation by perihepatitis, syphilitic gumma, tumours pressing on the portal vein. (2) Chronic peritonitis (rarely acute) evidenced by firm vascularisation and adhesions between the different abdominal organs. Peritonitis is one of the manifestations of syphilis in the fœtus. (3) Tumours or a distended bladder pressing on the large vessels in the abdomen. (4) Hypoplasia of the urinary apparatus (Opitz). (5) Defects in the circulatory system, e.g., absence of the ductus venosus Arantii with heart failure. (6) Escape of fluid from a distended bladder into the general peritoneal cavity producing ascites (Olshausen). Ballantyne collected 17 cases of ascites with a distended bladder. Fordyce believed that ascites was the

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result of bladder conditions. Sometimes "apparent" ascites may be due to a persistent cloaca (Cruickshank). In many cases no "apparent" cause for the ascites could be found.

External appearance in most of the cases was normal, except in a few cases where the anus was either absent or imperforate. Maceration was present in a fair number of cases, the peritoneum generally showed signs of inflammation. In the thoracic and abdominal organs no characteristic lesion was noted save some occasional malformations of the urinary apparatus such as dilation, atrophy or absence of the kidney and ureter on one side, distension of the bladder, or occlusion of urethra. Imperfect development of the genital organs was noted in a few cases.

Practically no characteristic change was found in any organ or tissue. The placenta was œdematous in a few cases.

Obstetrical significance.

Fœtal ascites has been observed to occur mainly in primiparæ and 2-paræ. Nearly all cases are premature, mostly between 7 to 8 months. Majority of the cases are vertex presentations, next to these come breech, transverse, face, brow presentations in order of sequence. Hydramnios has been noted in many of the cases. Uterine pains are usually weak from over-distension of the abdomen. Though difficulty is encountered in the delivery of the child from distension of its abdomen, which might necessitate artificial aid from simple traction to mutilating operations, yet fœtuses are often born spontaneously owing to prematurity and the compressibility of the abdomen when filled with fluid. Rupture of the uterus is extremely rare. Babies with ascites, no matter how they are delivered, are either born dead or die soon after birth. Congenital ascites has been observed to occur in the children of the same mother.

Summary.

(1) Dystocia from this cause is of rare occurrence, and when it does occur the true nature of the obstacle is apt to be overlooked. In both of our cases there was no dystocia. (2) Labour is generally premature, most cases occurring near about 7 months. In our cases both labours were premature. (3) None of the causes such as malformations of the urinary apparatus or a distended bladder, congenital syphilis, or portal obstruction were present in our cases. Both the mothers had a moderate degree of anæmia, while one of them had albuminuria in addition. Both were multiparæ. (4) Though there was no apparent evidence of peritoneal inflammation, the cytological examination of the fluid showed the presence of albumen and a high percentage of polymorphonuclear leucocytes which is suggestive of an inflammatory process. The cause of the inflammatory nature of the fluid is unknown and needs further investigation.

We express our indebtedness to Major P. Flemming Gow, F.R.C.S.E., D.P.H., I.M.S., Professor of Clinical Gynæcology and Obstetrics, for the specimens and clinical notes, and also to Major G. Shanks, M.D., I.M.S., Professor of Pathology, and to Dr. T. Sur, M.D., for giving us every facilities to publish this paper.

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HOW THE STRONGLY POSITIVE WASSERMANN CASES SHOULD BE REPORTED.

By RAI GOPAL CHANDRA MITRA BAHADUR,
Officiating Imperial Serologist to the Government of India.

I HAVE seen in my long experience many Wassermann cases reported as being 100 per cent. positive in the usual dilution of 1 in 10, continuing to be 100 per cent. positive in spite of treatment, this causing great despondency on the part of the patients, some of whom give up treatment as they think the disease is incurable, and doubts in the mind of the attending physicians as to the reliability of the test or the efficacy of the mode of treatment. This induced me to test the strongly positive sera in different dilutions, namely, 1 in 10, 1 in 20, 1 in 30, 1 in 40 and so on up to 1 in 240. I have been all along since 1912, when I first began to do this work, using a 1 in 10 dilution and reporting those as 100 per cent. positive that gave a 100 per cent. positive reaction with sera in a 1 in 10 dilution. But when I examined the strongly positive sera in different dilutions as stated above I saw that a certain serum which was reported 100 per cent. positive in 1 in 10 was really 100 per cent. positive also in 1 in 240. In order to explain how this examination was carried out, I must describe in brief my method of doing the Wassermann test.

Patient's serum.—The patient's blood is taken and is allowed to clot. The serum oozes out in half an hour and it is then centrifugalised or allowed to stand over-night in the ice chest. The serum is decanted and then heated to

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56°C. for half an hour. It is now ready for use.

Antigen.—I used to do the Wassermann test with four different antigens, i.e., cholesterinized alcohol, Noguchi's, uncholesterinized Bordet's and cholesterinized Bordet's. These antigens were previously titrated to see in what dilutions and doses they were free from anticomplementary action and their working doses were found out. Then their antigenic property was tested with several known strongly positive, moderately positive, doubtful and negative sera, and only those antigens were kept as "useful" the results of which compared favourably with the known good antigens in use. The dilution and dose of the useful antigens were noted on the labels and they were kept at room temperature in a dark place. Now I use three antigens, only leaving out Noguchi's.

Complement.—Healthy looking previously-tested guinea-pigs are bled from the heart, the safest amount of blood that can be taken from a big adult animal being 3 c.c. At least four guinea-pigs are bled to get a "pooled" complement. This blood is defibrinated with a sterile wire loop and centrifugalised and the serum so obtained is the complement. It is diluted with 0.85 per cent. sodium chloride solution in 1 in 10. It is now ready for use. The complement must be fresh and kept in an ice chest.

Amboceptor.—Two c.c. of thrice washed sheep's cells with 2 c.c. of saline are injected intravenously into rabbits every fourth day. They generally get 2 to 4 injections. After 10 days from the last injection their blood is tested to see whether they have developed antibodies suitable for our purpose, and those that develop good antibodies are bled from the heart. About 10 c.c. of blood can be drawn from each animal without danger to the animal. The blood is allowed to clot and the serum is centrifugalised and is heated to 56°C. Now it is titrated to find out its working dose and if it compares favourably with the known good amboceptor in use it is stocked in a refrigerator, noting the dilution and working dose on the label and also in a register kept for the purpose.

Sheep's corpuscles.—A sheep is bled from the jugular vein and the blood received in a wide-mouthed sterile bottle or flask containing a sterile wire loop. The blood is defibrinated, centrifugalised and the serum removed. The corpuscles are thrice washed with normal sterile saline solution and after the last washing the deposit is diluted to 1 in 20.

Technique of the test.

Now when the materials are ready the titration of the complement is done. This is very important as on it depends the main test. At first the hæmolytic system alone was tested and the working dose of the sheep's corpuscles for the day was found out as noted below:—

Six test tubes are taken in a stand. Half a c.c. of saline and half a c.c. of complement, diluted to 1 in 10, are added to each. The stand is kept in the incubator for one hour at 37°C. After this one working dose of the amboceptor and different doses of the diluted sheep's cells 0.2 to 0.7 c.c. are added to the tubes. The dose of the sheep's corpuscles which was hæmolysed between 15 to 20 minutes from the time of addition of the corpuscles is taken as its dose. But afterwards it was found that it would be better to add the antigen also in the preliminary test of the complement to combat or discount the anticomplementary action of the antigen and so the preliminary test for the complement is done now as noted below:—

Six test tubes are taken in a stand. Half a c.c. of saline is added to each. One working dose of the antigen and then half a c.c. of diluted complement is added to each tube. The stand is kept in the incubator for one hour. Then one working dose of the amboceptor is added and finally different doses of sheep's cells, viz., 0.2, 0.3, 0.4, 0.5, 0.6, and 0.7 c.c. are added. I take that dose of the sheep's corpuscles as the working dose for the day that is completely hæmolysed in five minutes.

Having done the titration of the complement, I proceed to do the main test, which is the same as the preliminary test, the only difference being that the patient's serum 1 in 10 is put in in place of the saline solution. As soon as the controls are all right I read the result, calling those cases very strongly positive (that is 100 per cent.) where there is complete inhibition of hæmolysis, moderately positive when there is only moderate inhibition of hæmolysis, slightly positive when there is only slight inhibition of hæmolysis, and absolutely negative when there is complete hæmolysis.

As I said before that I used four (now three) different antigens for each case, I should note here that I take that case to be 100 per cent. positive which shows complete inhibition with the comparatively weakest antigen, and that to be absolutely negative which shows complete hæmolysis with the comparatively strongest antigen. The partially positive cases must be positive more or less with all antigens.

Controls.

Now I should say a few words about the *controls*, which are most important. As the result of the test depends upon hæmolysis or inhibition of hæmolysis of the sheep's corpuscles, the control should prove satisfactorily that the hæmolysis or inhibition of hæmolysis, partial or complete, is not due to the individual action of any of the five materials, so I keep two controls for each serum, whether it is hæmolytic or anticomplementary. If the serum is hæmolytic, viz., if the sheep's corpuscles are hæmolysed without the addition of amboceptor, it proves that the said serum contains natural amboceptor for the sheep's corpuscles. This sort of hæmolytic serum is prone to give false negative results, especially if the serum is only slightly positive.

The serum may also be anticomplementary, i.e., the serum may contain such substances that will absorb or destroy a certain portion of the complement, consequently it may give false positive reaction, i.e., if an anticomplementary serum is really negative it may give a strongly

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or partially positive reaction. As the anticomplementary action of serum is enhanced by the addition of antigen I should mention here that if a serum shows in the control a slight anticomplementary action, it is more markedly so in the actual test. The question is how these sera should be rectified. What I do is this:—

If the serum is hæmolytic it is diluted with nine parts of sheep's cells in saline (1 in 20) and kept at room temperature for half an hour. The sheep cells are agglutinated by the natural amboceptor present in the serum and they often fall to the bottom of the test tube like a piece of clot. When this is centrifugalised we get amboceptor-removed serum in about 1 in 10 dilution. The amboceptor-removed serum when examined again is no longer hæmolytic. As regards the anticomplementary serum it is very difficult to rectify it, and to get a good result from such serum I dilute such anticomplementary serum to 1 in 10, 1 in 20, 1 in 30 and 1 in 40 and so on and compare the controls with those tubes in the actual test. But as I said before that anticomplementary sera are more anticomplementary with antigen, the basis of comparison is not satisfactory, and so I generally give no opinion on such sera unless there is a very marked difference between the control and actual test tubes. As I have not come across any hæmolytic antigen I keep only one control to see that the antigen is not anticomplementary. In this control tube the antigen only is added to the hæmolytic system and the serum is replaced by saline. The remaining three things, i.e., the complement, the amboceptor and the sheep corpuscles, are controlled by the preliminary test done for the titration of the day's complement.

I have up to this date examined in different higher dilutions about 400 strongly positive sera giving 100 per cent. positive reactions with 1 in 10 dilution, and have obtained 100 per cent. positive reactions as noted below:—All cases that gave 100 per cent. positive reaction with 1 in 10 dilution gave 100 per cent. positive reaction with 1 in 20 dilution also.

Per cent.	Cases gave per cent.	Positive reaction.
92	100	1 in 30
65	100	1 in 60
40	100	1 in 90
30	100	1 in 120
25	100	1 in 150
18	100	1 in 180
6	100	1 in 210
3	100	1 in 240

The cases that gave 100 per cent. positive reaction in high dilutions were generally the untreated secondary cases. All the above cases were new cases who have been repeatedly examined to see up to what highest dilution they are 100 per cent. positive.

I examined all cases first with 1 in 10 dilution of the sera. Those cases that were negative, doubtful or partially positive with this dilution were reported as such, though they were again examined with 1 in 5 dilution. In this latter dilution most of the cases gave a stronger reaction, but this result was not reported, as it would be rather premature to give an opinion like that without further research. I examined those cases that gave 100 per cent. positive reaction with 1 in 10 dilution, again in higher dilutions as noted before, i.e., 1 in 20, 1 in 30 and so on, and noted the highest dilution in which there is complete inhibition of hæmolysis.

I have been carrying on these experiments for the last four years. During this period only 34 cases came back for re-examination of their blood after treatment. Out of these 3 cases came back after about 3 years, 8 after about 2 years, and 5 about a year and a half, and 18 cases after more than a year. Those who came back within one year are not included here. The results of their tests are noted below:—

Number of cases.	Result of previous examination.	Result of second examination.
10	100 per cent. positive in dilution of 150 to 180.	100 per cent. positive in 1 in 10 .. 3 1 in 30 .. 5 Negative .. 2
24	100 per cent. positive in 30 to 150 dilution.	100 per cent. positive. 1 in 10 .. 8 1 in 30 .. 6 1 in 60 .. 2 1 in 100 .. 5 Negative .. 3

I have come across about 8 cases who persisted to be 100 per cent. positive in 1 in 10 dilution in spite of most active treatment, but as I did not test their blood in different dilutions before, I cannot say in what dilution they were positive before and whether the treatment they had really had any effect.

It will be a great help to the physicians and patients if in the case of the 100 per cent. positive Wassermann cases it is reported in what dilutions they are 100 per cent. positive, and if this result is compared later with the results of the future test.

NOTES ON MUSEUM MAKING.

II.

DETAILED TECHNIQUE OF GLYCERINE GELATINE MOUNTING.

By P. V. GHARPURÉ, M.D. (Bom.), D.T.M. & H. (Eng.),
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THIS method of mounting slices of diseased and normal organs has been in practice in Western laboratories for a number of years. The objects so mounted possess several advantages as has been referred to in my former note.

After several experiments with the composition and technique the following method was found by me most suitable for the conditions

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present in Bombay. As the results were satisfactory I published a small note embodying the composition used by me.

Since publishing this note, "A Note on Museum Making" in the *Indian Medical Gazette*, Vol. LXIV, No. 12, December 1929, I have had several enquiries about the details of the gelatine technique as used by me. Only a few of the enquiries have I been able to answer personally by actual demonstration and instructions.

Hoping that the details contained in the following notes will prove useful I am submitting them for publication.

Preparation of the gelatine mass.

(*a*) A large flask is filled to three-fourths its capacity (8,000–10,000 c.c.) and when the water starts boiling arsenious acid is added. It will be found that the acid is not very freely soluble in water. Clear tap water serves the purpose as well as distilled water, the former has even some advantages. The acid is added until a fair amount is seen deposited at the bottom. The solution is aided by shaking at frequent intervals after addition of the powdered arsenious acid.

The flask is then allowed to cool and the solution filtered and stored. It lasts indefinitely.

(*b*) *Gelatine mass.*—Gold Label gelatine 280 grams is weighed on a rough balance. It is cut into small pieces roughly two inches square and put into a tall beaker of about 800 c.c. capacity, some quantity of distilled water being added; the gelatine is allowed to soak for a couple of minutes aided by gentle pressure with the hand. The distilled water is then squeezed out of the gelatine by manual expression, and 400 c.c. of saturated arsenious acid solution are added to the gelatine thus soaked. The beaker is then transferred to a water bath and kept at the temperature of boiling water until all the solid gelatine has melted, to form a semi-transparent mass of fairly thick consistency. This takes nearly three hours. In another beaker 1,600 c.c. of clear (it need not be chemically pure) glycerine is warmed on a water bath at a temperature of boiling water and to it is added the melted gelatine (both being hot). This mixture is gently stirred with a glass rod and allowed to remain on the water bath for one hour. The beaker containing this mixture is then withdrawn from the water bath and allowed to cool down to room temperature [in Bombay 72°F.–92°F.]

After it has cooled down and it is still liquid (it takes fairly long, about 6–8 hours, to set into a solid mass), white of egg collected in a small beaker and beaten with a glass rod (one egg to each 1,000 c.c. of the mixture) is poured into the mixture and intimately mixed by vigorous stirring with the rod. It will be found that the white of the egg mixes without being coagulated. The beaker is then transferred to the water bath and the water kept boiling for about 6 hours. The subsequent step can be carried out the next morning even, as the mass can be re-melted on the water bath, if it sets during the night. Heating is continued till fairly large clumps of precipitate of albumin are seen in the column of the mixture. If at this stage the flame is shut off and the mixture allowed to cool, a greater part of the precipitate settles down to the bottom and the whole mixture can be filtered through fine muslin (two layers) in the hot funnel, the temperature of the water bath being at boiling while filtering is going on. The filtrate is collected in a tall beaker and put on the water bath for about one hour and filtered through filter paper in the hot funnel. This filtrate is the one used for mounting specimens. It can be stored in open beakers or in wide-mouthed stoppered bottles and is ready for use. It keeps well for about a month. This forms a solid mass of such consistency that a pressing finger finds it elastic without any liquid sticking to the finger tip.

Preparation of the specimen.

After receiving the specimen it is washed in salt solution of approximately normal strength to remove all extraneous blood, sliced and fixed in any fixative for a sufficient number of days; this depending on the size of the specimen, etc., or injected if required.

After it has fixed properly it is washed in running water for several hours and transferred to 90 per cent. alcohol (but not lower) and allowed to remain in alcohol until the colours are well recovered. It is then washed under running water so as to free it from all traces of alcohol.

It is then transferred for a short time—15 minutes or so—to a mixture of equal parts of glycerine and saturated arsenious water just before it is mounted. If it is to remain sometime before mounting it should be returned to Kaiserling No. 3 in which it can remain indefinitely.

The method of mounting in use at present in our laboratory is as follows:—

Simple wooden strips are cut of requisite size and thickness, glass plates are either cut or obtained from old photography plates. The strips of wood are stuck on one plate of glass by "Syngala Cement"* as shown in the diagram below (Fig. 1).

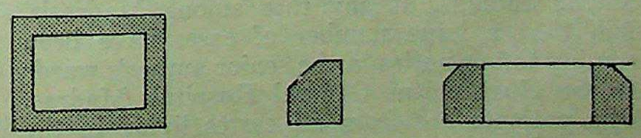

FIG 1. FIG 2. FIG 3.

* This cement can be had from:—"SYNGALA" Ges. m.b.H. Fabrik fur Chem-Synth. und galen. Arzneimittel, Wien, XVI. Seebockgasse, 22.

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The outer and upper border of the wood is bevelled as shown in the diagram (Fig. 2 above).

The gelatine mass is just melted, filtered if necessary (through muslin) and kept on the water bath till all bubbles disappear.

A small quantity is poured on the edge of the wood and the corners are well rubbed with the finger tip. The cell is then filled with the gelatine melted mass which has cooled down and the specimen is slipped in (removed from the glycerine and arsenious acid mixture) avoiding introducing air bubbles, and a glass plate of the same size is put on as a cover glass. This is best accomplished by putting the cell in a small shallow tray. The cover glass is first touched at one side and gradually allowed to drop till it rests on the frame (Fig. 3 above). The whole preparation may be cooled by lumps of ice being placed on the cover glass and taken out of the tray after about 4 to 6 hours. The edges are cleaned with a piece of dry cloth, the wedge under the cover glass is filled up with "Syngala Cement," then the sides are properly covered with cement and immediately after smearing the edge is pressed on another plain glass moistened freely with cold water. This manipulation gives a polish to the surface.

The label can be introduced inside the cell by pasting a strip of paper with the name of the specimen or any other details on to the cover glass so as to have the reading surface uppermost. The label keeps in position indefinitely. It no doubt becomes transparent but the writing is at all times preserved.

I desire to express my thanks to Mr. N. V. Gharpuré, my brother, for the diligent work he did in completing the minute details of this technique, and to the Professor of Pathology for his encouragement in the work.

THE FREQUENCY OF SPRUE AMONG INDIANS IN MADRAS.

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Professor of Medicine and First Physician, General Hospital,
and
K. N. MURTHY, M.B. & B.S.,
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OUR object in writing this paper is to point out that sprue is an extremely common disease among Indians, at any rate among Madrasis, and that a large number of cases have been coming to our notice in the senior author's wards at the Government General Hospital, Madras. The patients are from all castes living in the city of Madras, and there are also a few cases that have come from Mambalam, a suburb situated four miles away to the south of the city on the South Indian Railway. Mambalam is built on the site of a tank which has been recently drained. It, therefore, has a loose alluvial soil and a damp atmosphere. It has no protected water-supply and the people are dependent upon the well water which is a hard water. There is not much variation of temperature between Madras and Mambalam. Loose soil, damp atmosphere and a hot climate may therefore have some definite bearing upon the ætiology of the disease.

It does not seem to us that the disease is a peculiar affliction of Europeans alone. Both races suffer from identical symptoms and our laboratory investigations fully confirm this observation. The susceptibility of both races frequently depends upon some antecedent ailment rather than upon the social and economic condition of the individual. Our cases are chiefly from the well-to-do classes and not from the cooly classes of the city.

The age incidence in our cases of sprue was between 20–54 years and we practically never came across a case in children or in very old individuals.

In most of our cases there is a history of some form of dysentery, amœbic or bacillary, and of morning diarrhœa with a quiescence of symptoms and recrudescence following later. There is no history of addiction to alcohol or tobacco. The test meal in some of the cases studied showed hypochlorhydria. These precursors, viz., dysenteries, morning diarrhœa, hypochlorhydria and gastrogenous form of diarrhœa, should put us on guard to institute appropriate measures to prevent the development of sprue. Depressing circumstances such as mental worry, fatigue, and insomnia precipitate the onset of sprue, which exhibits typical symptoms as diarrhœa, with pale large frothy motions, progressive emaciation, varying degrees of anæmia, the severest resembling and often indistinguishable from a true Addisonian anæmia, apyrexia, a boggy, blown-out abdomen and an ulcerated tongue. In four out of twelve cases the anæmia was of a severe type and the patients had the blood picture of a typical pernicious anæmia. Test meal results showed hypochlorhydria in all cases, and achlorhydria in four cases, but we have not tested whether the latter cases were ones of true achylia gastrica.

To find out the nature of the anæmia, as a routine, the van den Bergh test was carried out. This test in a majority of our series gave an indirect positive reaction varying from $\frac{1}{2}$ to 2 units. This certainly indicates a high degree of hæmolysis taking place in the system. The fragility of the red corpuscles is found to be practically normal in all our cases, and therefore the hæmolysis is not due to any abnormality in the chemical composition or in the nature of the red cells. This led us to look for other evidence to account for the hæmolysis. In some of our cases hæmolytic streptococci have been isolated ærobically from both the stool and urine. In other cases wherein it was hardly possible for us to describe them as

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true sprue or pernicious anæmia, anærobic cultures of the stool have been made and a Gram positive bacillus, probably *B. welchii*, was isolated in four of our cases so far. We think that probably the hæmolytic streptococci alone or *B. welchii* or both are responsible for the cause of the hæmolytic type of anæmia. We do not think that *Monilia psilosis* or other secondary invaders of the gut can bring about severe anæmia, though they may act prejudicially to the individual in lowering his resistance.

With the use of autogenous vaccines prepared from the organisms recovered from the gut, and with a proper supply of the deficiencies biochemically found in the body, we often find the symptoms of sprue completely alleviated, with the exception of the anæmia. This anæmia has a blood picture of a pernicious type and it is found to persist for very long. All known methods of bringing about hæmopoiesis so far known have been tried in our cases, but the anæmia did not improve beyond a certain stage. The persistence of the anæmia may probably be due to the damage previously sustained by the hæmopoietic system, being far less in adults among whom the disease is found to be common.

BLOOD GROUPS AND HEREDITY.

By ANIL CHAUDHURI, M.SC., M.B., D.T.M.,
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SCIENTISTS hope that the social system of man can be entirely changed if the qualities of man, his intellect and his body, his diseases and his immunities, his virtues and vices are found to be transmitted under fixed laws of heredity and are dependent upon the presence or absence of definite unit characters. But, alas, we are almost entirely ignorant of the unit characters that go to make the difference between one man and another, as very few diseases, such as congenital cataract, alkaptonuria, digital malformation, and probably the colour of the iris, are stated to run upon Mendelian lines.

The subject of human heredity is difficult and hence investigation on this line is at a snail's speed. Only very recently another unit character has been added to the list. It is the blood group factor. Von Dungern and Hirschfeld have conclusively proved that agglutinins are hereditary and follow the Mendelian law. This observation had, however, been made long before this in a paper by Epstein and Ottenberg (1908).

Iso-agglutinins in the human serum were discovered independently by Landsteiner and Shattock in 1900. With the recently increasing popularity of blood transfusions, the phenomena of iso-agglutination and hæmolysis, the two being very closely related, have attained a more practical significance. In fact all human bloods can be divided into four sharply-defined groups according to the way in which they inter-agglutinate. Moss and Janskey classified the groups numerically, but Landsteiner suggested that they should be classified according to the agglutinogen content of the cells.

The group characteristics are permanent for each individual throughout his life. When concentrated, the agglutinins act almost instantaneously; when diluted they act more slowly. Agglutination occurs in cold as well as at high temperatures.

Anomalous bloods which do not come under any of the four above-mentioned groups are sometimes reported by authors. These exceptional cases are due to pseudo-agglutination, low agglutinogen-agglutinin titre, failure of complete adsorption in adsorption experiments and, according to Lloyd and Chandra, to the phenomenon of auto-agglutination. But the fact is that the four well recognised groups do include almost all cases, for anthropological purposes.

As it is not unreasonable that the proportional distribution of the blood groups in a people may shed light on its racial origin and relationship, I have taken up the study of this unit character in the course of my studies on racial immunity. I have limited my observations only to the Bengali Kayasthas of West Bengal with the idea that if the blood groups are studied tract by tract and caste by caste in India, probably they may throw some light on the racial constitution of India, nay of the whole world.

The specimens of the Kayastha blood I collected were all random samples from different places in West Bengal and were examined fresh, within a few hours of withdrawal. They were all examined both with standard cells and standard serum of every group. Remixing of the cells with the aid of the glass rod was done in order to break up the rouleaux formation and to favour agglutination. I used the same standard reagents throughout my experiments and from day to day checked the potency of my standard solutions in order to avoid as far as practicable any sources of error. I have studied altogether 30 families of Kayasthas. The study of the family inheritance is very difficult in Bengal as the very idea of blood letting is shocking to its people; as also getting admittance inside the purdah in order to collect the samples of blood from females and children is extremely difficult. Though two classifications, the Moss and Janskey, are in current use, I have adhered to the Moss classification in my experimentations.

As the connection of the blood groups with diseases is very important from the point of view of racial immunity, I tried to note from my subjects when I collected the samples of blood from them the history of previous illness, the nature of their diet they took, the presence of any constitutional disorders and diseases. But I cannot establish any correlation with such diseases as malaria, kala-azar, typhoid, syphilis, etc., with blood group factors. Some observers.

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however, have linked blood groups with various constitutional disorders. It was put forth by Alexander that groups I and III persons are susceptible to malignant diseases. Hirzfeld, Hirzfeld and Brokman tried to prove some relationship between blood groups and diphtheria. Furst, on the other hand, has tried to show that goitre is related in some way or other to particular blood groups. Similarly, Strarzynski held that there is a correlation between the blood groups and the rapidity of the disappearance of the Wassermann reaction under treatment. Snyder studied several hundred cases of epilepsy, insanity and feeble-mindedness among both whites and Amer-Indians. He found that the distribution of the groups is similar both in the neuropathic population and normal persons of the same race. Thus it can be said that there is no influence of the blood groups on diseases and drugs, age and sex or occupation and climate.

Let us next consider the question of heredity and blood groups. Following exactly the statistical considerations of Ottenburg (1923), I find that there is good agreement between the calculated results and the results actually found of the hereditary qualities of the blood amongst the Kayasthas of Bengal. There were

Group I = 12.
Group II = 32.
Group III = 50.
Group IV = 60.
} Total 154

persons in my series of cases.

Apparently there are 62 B persons as against 92 b persons having an approximate ratio of B:b :: 2:3.

It is next necessary to find out what proportion of individuals of BB and Bb respectively there must be so that the succeeding generations will show:— B : b :: 2 : 3.

Let BB = p and Bb = q.

(I) Then BB : Bb : bb :: p:q: $\frac{3}{2}$(p+q). The proportion of B germ cells from this will be (2p+q) and of b′ germs cells (3p+4q).

The ratio of the germ cells will be:—

Sperm.

	(2p+q) B	(3p+4q) b
(2p+q) B Ova (3p+4q) b	BB Bb	Bb bb

Then the proportion of individuals in the next generation will be:—

(II) BB : Bb : bb :: $(2p+q)^2 : 2(2p+q)(3p+4q) : (3p+4q)^2$

As supposed (I) and (II) are equal, then we have:—

$$\frac{p}{q} = \frac{(2p+q)^2}{2(2p+q)(3p+4q)}$$

$$= \frac{2p+q}{2(3p+4q)}$$

Or $6p^2 + 8pq = 2pq + q^2$

Or $6p^2 + 6pq - q^2 = 0$

$$\text{Or } p = \frac{-6 \pm \sqrt{36+24}}{12} \times q$$

$$= \frac{-6 \pm 2\sqrt{15}}{12} \times q$$

$$= \frac{-3 \pm 3{\cdot}873}{6} q$$

Or q ×.14 (approximately).

Substituting in (I) the values 14 and 100 for p and q we get,

BB : Bb : bb :: 14 : 100 : 171
or approximately 1:7:12.

The recessive b can only appear as the offspring of III—III unions where both the parents carry it and then it will appear in $\frac{1}{4}$ of offsprings (Mendelian law). The chance for one parent being is $\frac{110}{114}$ and for both being is $\frac{100}{114} \times \frac{100}{114}$.

Therefore the expectation of b (group IV) offspring from III—III union is

$\frac{100}{114} \times \frac{100}{114} \times \frac{1}{4} = \frac{10{,}000}{51{,}984} = 19$ per cent. (approximately), the expectation of B (group III) offspring being 81 per cent. There was actually found 20 per cent. and 80 per cent. respectively.

The proportion of B and of b children expected from group IV—III marriages can be found out; of group III persons in my series 12.7 per cent. (approximately) are pure BB, and 87.3 per cent. are Bb.

Of the 12.7 per cent. BB, all the union with group IV (i.e., of Bb—bb union) the children will be half B, half b. Hence the expectation of B children from IV—III marriages will be $12.7 + \frac{87.3}{2} = 56.3$ per cent. and conversely of b (group IV) = 43.7 per cent. There are actually found 57.1 per cent. and 42.9 per cent. respectively.

In a similar way the calculation is carried out for marriages of persons having A (chiefly group II).

There are apparently 44 A persons to 110 a persons in my statistical population. Therefore from A.A. marriages the expectation of a (group IV) children is 20 per cent. and of A (group II) children is 80 per cent. There are actually found 18.8 per cent. a and 81.2 per cent. A.

Similarly the total of group (II) A children to be expected from IV—II unions are 54 per cent. and of group IV (a) children 46 per cent. There are actually found 52.9 per cent. A and 47.2 per cent. a respectively.

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Thus from statistical considerations it is found that the figures show quite a close correspondence between the expected and actual percentages in Bengal Kayasthas.

The factors of the blood groups are commonly inherited as two independent pairs of Mendelian factors. The agglutinogens A and B are dominant to their respective agglutinins a and b. Bernstein (1925) on the other hand has proposed another theory on the basis of mathematical considerations of group percentages in various peoples. According to him the mode of inheritance may more adequately be explained on the hypothesis of three multiple allelomorphs. The agglutinogens A and B are both dominant to the same recessive R. The heterozygote AB forms group I. The agglutinogens are only inherited and the agglutinins are out of heredity controls.

Snyder has however supported this theory of Bernstein by the study of family inheritance in a large number of cases as well as on mathematical considerations of the group percentages. In my series of cases also, though small, yet I have not found any group IV child in any parent of group I.

The following table indicates the results of the inheritance studies of blood groups in families of Bengal.

Mating.	Number of families.	Children in group I	II	III	IV
III—III ..	4	0	0	16	4
III—IV ..	7	0	0	24	18
IV—IV ..	5	0	0	0	26
IV—II ..	4	0	9	0	8
II—II ..	3	0	13	0	3
II—III ..	2	6	2	3	1
II—I ..	1	3	2	0	0
IV—I ..	3	0	6	7	0
III—I ..	1	3	0	0	0

The medico-legal aspect of the question of the blood groups should be discussed before concluding this paper. The use of these tests can be applied to the determination of identical twins. If the suspected babies have different blood groups they cannot be univitelline twins. Moreover, we see that a group I parent can never have a group IV child. Neither can a child other than group IV be expected when both the parents belong to group IV; nor can a group IV child be the outcome of I and II, I and III or I and I marriages. Similarly, offsprings of group III or IV can only be expected when the unions are between group III and III, or group III and IV. These blood group characteristics are so certain that they are taken as evidences in some European law courts whenever there is a dispute over the question of the determination of paternity of a child. Unfortunately this evidence has not yet been introduced into the Indian law courts as yet. But it is hoped that soon this system will be popular and authoritative legal evidence.

Lastly, I must thank Dr. Tarak Nath Sur, Offg. Professor of Pathology, Calcutta Medical College, for his kind help, and Rai Bahadur Gopal Chandra Mitra, Offg. Imperial Serologist and Professor of Serology, and Capt. S. N. Chandra, Assistant Professor of Serology, for their useful suggestions and kind instruction on the technique of blood group determination, as followed in the Calcutta School of Tropical Medicine and Hygiene.

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INTRAVENOUS SODIUM BICARBONATE IN CASES OF NERVE PAIN IN LEPROSY.

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WORKERS in leprosy know well how difficult sometimes it is to overcome the nerve pains of lepers by various medicines in all the usual ways of administration, oral, injections and local applications. We recently had two patients in hospital; in addition to neuritis, one of the patients had pain at first in the knee and elbow joints and then in the shins, while the other had pain in the wrists and ankles as well as in the knee joints. Neither of them had fever. One medicine after another was tried. Most of the medicines had an effect temporarily, say for 5 to 6 hours, and continued to have an effect on repeating for 2 or 3 days. Then they ceased to alleviate the pains and a new remedy had to be found. The pain became so severe that finally even the injection of morphine hydrochlor. gr. ¼ was not sufficient to keep them under its influence more than 12 hours. The following were tried:—

1. Neutralon (Collosal) ʒi t.d.s.
2. Aspirin up to 40 grs. in 24 hours.

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3. Adrenalin by injection 3 times a day.
4. Ephedrine by mouth gr. ½ twice and thrice a day.
5. Sodium salicylate daily intramuscularly.
6. Potassium antimony tartrate intravenously.
7. Lotio plumbi cum opio. } Local applications, combined with one or other of the above remedies.
8. Emp. glycerinæ belladonnæ. }

After a period of 4 weeks as a last effort an intravenous injection of sodium bicarbonate ½ per cent. in normal saline solution was decided upon and 150 c.c. was injected into each of the patients by direct vein-puncture.* These injections lessened the pain and the patients got relief to such an extent that from that day they did not want any hypnotic, which had been a daily necessity previously. After five days another 200 c.c. was injected into each patient. They were discharged on the next day and are now doing quite well.

My thanks are due to Dr. Wardman for her kind permission to publish this note.

* (This is a form of treatment advocated by Dr. E. Muir.—ED., *I. M. G.*)

HALOMETRIC READINGS IN INDIANS.

(A PRELIMINARY NOTE.)

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and
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THIS paper deals with the readings of the blood films of Indians by means of Eve's halometer.

The observations mentioned below were made mainly on the students of the Berry-White Medical School and on some patients of the indoor hospital attached to the same school; it is, therefore, possible that they may not apply equally well to all classes of Indians in all parts of India. But, as we believe our paper to be the first one of its kind dealing with at least a section of the Indian people, we have adopted the above title for this article.

A very brief hint about the instrument (the halometer) may not be out of place here.

The halometer is an instrument for measuring the diameter of a red blood corpuscle from the size of the rainbow coloured circle or halo produced by light passing from a constant source through a thin fresh film of blood consisting as far as possible of a single layer of cells.

It consists of a small dark viewing box from which light (either natural or artificial) comes out through a window or hole on one side. The slide examined is seen in this light against the window. There is a scale and an indicator on one side of the box adjacent to that with the window. Readers wanting further details are referred to the *British Medical Journal* of July 13th, 1929. The scale of the halometer measures the diameter of the halo. The calibration gives the angular measure of the halo in numerical figures on the scale representing degrees. These readings can be converted into the average size of a red blood cell of the sample of blood examined by reference to a printed table which is sent out with each instrument by the makers. A copy of such a table is shown below (*vide* Table I) as reference to it will be necessary in our discussion.

TABLE I.

For converting halometer readings into actual average diameter of red blood corpuscles.

European standard.

NORMAL BLOOD.		PERNICIOUS ANÆMIA.	
Halometric degrees.	Microns.	Halometric degrees.	Microns.
4.6	7.48	4.0	8.60
4.7	7.32	4.1	8.39
4.8	7.17	4.2	8.19
4.9	7.02	4.3	8.00
5.0	6.88	4.4	7.81
		4.5	7.64

The invention of the halometer and the ease with which it gives an approximate idea of the size of the red blood cell at the bedside of the patient makes it very useful in the early diagnosis of pernicious anæmia and other allied disorders.

It is claimed to be diagnostic of pernicious anæmia in the "pre-pernicious" stage, i.e., before the usual blood changes appear.

The ease with which it can be used tempted us to try it to form an idea about the diameter of the red blood cell of Indians—both healthy and diseased. The number of cases discussed in this paper is small but the findings are striking enough to excite one's curiosity.

Our first attempt was to find out if the average normal reading in the scale of the halometer is the same in Indians as in Europeans. In order to test this we selected 48 persons who appeared healthy and did not show any obvious sign or symptom of disease. Of these persons 44 were students, 2 were doctors and 2 were the members of the menial staff of the Berry-White Medical School.

A fresh thin blood-film of each subject was examined by the halometer and the figure on its scale was noted. All possible precautions with regard to the preparation and examination of the film, as pointed out by Dr. Eve in the *British Medical Journal* of August 16th, 1930, were taken. Along with these readings the percentage of hæmoglobin of each subject was examined by the Taliquist hæmoglobin scale, used with the usual precautions. All these findings are noted below in a tabular form against the name of each subject (*vide* Table II).

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TABLE II.

Serial number.	Name.	Halometric figures.	Percentage of hæmoglobin.
1	Sj. B. C. B. ..	4.5	80
2	„ M. D. G. ..	4.4	75
3	„ I. M. D. ..	4.4	80
4	„ D. M. ..	4.6	80
5	„ H. R. ..	4.4	75
6	„ K. B. ..	4.2	75
7	„ R. D. ..	4.6	70
8	„ J. C. S. ..	4.6	75
9	„ A. A. K. ..	4.5	75
10	„ J. S. T. ..	4.35	80
11	„ S—Chaprassi	4.5	80
12	Md. I. A. ..	4.3	75
13	„ S. A. ..	4.6	70
14	Sj. R. P. ..	4.6	75
15	Md. S. ..	4.5	70
16	„ U. ..	4.4	75
17	„ S. H. ..	4.5	75
18	„ B.—Ward Boy	4.3	70
19	R.	4.2	80
20	Md. A. H. ..	4.6	75
21	Sj. S. S. ..	4.5	75
22	Md. I. A. ..	4.5	90
23	Sj. S. C. ..	4.3	80
24	„ M. L. ..	4.5	80
25	„ T. S. ..	4.5	75
26	„ B. S. ..	4.8	75
27	Md. D. A.—Sardar	4.3	75
28	Sj. G. K. ..	4.4	70
29	„ D. D. ..	4.8	75
30	„ U. M. ..	4.4	80
31	„ S. B. ..	4.4	85
32	„ D. M. ..	4.3	80
33	Dr. B. K. D. ..	4.3	80
34	Sj. R. G. ..	4.5	80
35	„ A. D. ..	4.6	85
36	„ B. K. ..	4.5	75
37	„ J. B. ..	4.3	75
38	„ H. ..	4.2	80
39	„ P. D. ..	4.6	85
40	Capt. H. B. ..	4.4	85
41	Sj. K. C. ..	4.1	85
42	„ P. K. ..	4.3	80
43	„ H. ..	4.4	80
44	„ M. ..	4.4	80
45	„ H. ..	4.3	75
46	„ J. D. ..	4.4	75
47	„ L ..	4.6	80
48	„ R. ..	4.4	90

On studying the findings in Table II we can deduce Table III which shows one after another the number of subjects showing one particular figure on reading:—

TABLE III.

Halometric readings.	Number of persons with this reading.	Remarks.
4.1°	1	37 towards pernicious side, i.e., about 77 per cent. (European standard).
4.2°	3	
4.3°	10	
4.4°	12	
4.5°	11	
4.6°	9	11 towards normal size, i.e., about 23 per cent.
4.8°	2	
Total .. 30.9°	48	

Here in Table III we find that 37 out of 48 subjects or 77 per cent. show a halometric reading varying from 4.1 to 4.5, i.e., they show a reading suggestive of pernicious anæmia according to the European standard. The rest, i.e., 11 or 23 per cent. show readings from 4.6 to 4.8, i.e., within the normal European range. It is most unlikely that 77 per cent. of these subjects, who are apparently quite healthy, are in the pre-pernicious stage, i.e., about to develop pernicious anæmia. So we may assume that the European standard of halometric reading is not applicable to Indians.

As a large percentage of Indians do not approach the European standard in measurement of bones, height, weight, etc., so it is not unlikely that in halometric examination also they may have readings different from those of Europeans.

We also find in Table III that the largest number of subjects (about 68 per cent.) show a reading from 4.3 to 4.5. So we are justified in assuming that the normal range of reading in our series of healthy subjects reported in this paper is from 4.3 to 4.5, corresponding to the readings of 4.6 to 5.0 of Europeans.

We further see from Table III that the biggest single batch, i.e., a batch of 12, show a reading of 4.4; and we come to the same figure by working out the average of the total of Table III thus—

$$\frac{30.9}{7} = 4.4$$

Now let us study the figures showing the percentage of hæmoglobin in Table II. This leads us to deduce Table IV below, which shows batch by batch the number of persons with a definite percentage of hæmoglobin.

TABLE IV.

Percentage of hæmoglobin.	Number showing this percentage.	Remarks.
70	5	Largest group.
75	19	
80	17	
85	5	
90	2	
Total ..	48	

Here we find that the largest number had a hæmoglobin percentage varying from 75 to 80 per cent.

But from Table II it is evident that the rise and fall in the percentage of hæmoglobin has no definite relation to the halometric readings. We can however infer the following from the same table.

1. Out of 10 persons with a halometric reading of 4.3, 9 had a hæmoglobin percentage ranging from 75–80 per cent.

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2. Out of 12 persons with a halometric reading of 4.4, 8 had a hæmoglobin percentage ranging from 75–80 per cent.

3. Out of 11 persons with a halometric reading of 4.5, 9 had a hæmoglobin percentage ranging from 75–80 per cent.

Or in other words, a large majority of all persons with a halometric reading varying from 4.3 to 4.5 had a hæmoglobin percentage varying from 75 to 80 per cent.

A reference to Table III will again show that a majority of persons examined had a halometric reading varying from 4.3 to 4.5.

So we may conclude that in this series of 48 healthy Indians we examined:—

(1) The majority had a halometric reading of 4.1 to 4.5, i.e., towards the pernicious side according to the European standard.

(2) The average halometric reading was 4.4, which is also towards the pernicious side if judged by the European standard.

(3) It appears to us that the normal halometric reading for Indians is between 4.3 to 4.5, instead of from 4.6 to 5.0 (the European normal).

In other words it appears that normally the diameter of the red blood cell of Indians varies from 8 to 7.64 microns, and of Europeans from 7.48 to 6.88 microns (*vide* Table I).

(4) The majority of our subjects had a hæmoglobin percentage varying from 75–80 per cent.

(5) The rise and fall in hæmoglobin percentage has no definite relationship to the halometric readings.

We next tabulate below our findings on 8 definitely diseased persons (Table V).

TABLE V.

Showing relation of the blood pictures of diseased persons to halometric readings.

Serial number.	Caste, age and sex.	Disease.	Blood picture.	Halometric reading.	Other findings.	REMARKS.
1	N. I., Mahomedan male, 27 years.	Ankylostomiasis.	R.B.C.—3,040,900 per c.mm. W.B.C.—8,000 per c.mm. Hæmoglobin—65 per cent. Colour Index—1.08. (Nucleated R.B.C.—present).	4.2	Stool shows:—hookworm ova, + + + +; whipworm, +.	Pernicious type.
2	A. W., Mahomedan male, 30 years.	Do.	R.B.C.—2,660,000 per c.mm. W.B.C.—8,420 per c.mm. Hæmoglobin—50 per cent. Colour Index—0.9.	4.4	Stool shows:—hookworm ova, + + + +; *E. histolytica* cysts, +; *E. nana*, +.	
3	D., Mahomedan male, 45 years.	Do.	R.B.C.—307,000 per c.mm. W.B.C.—10,000 per c.mm. Hæmoglobin—55 per cent. Colour Index—0.9.	4.3	Stool shows:—hookworm ova, + + +.	
4	B., Hindu female, 15 years.	Do.	R.B.C.—2,540,000 per c.mm. W.B.C.—6,600 per c.mm. Hæmoglobin—45 per cent. Colour Index—0.9.	4.3	Stool shows cysts of *E. histolytica*, + +; and hookworm ova, + + +.	
5	P., Hindu female, aged 15.	Malaria (B. T.)	R.B.C.—3,210,000 per c.mm. W.B.C.—5,200 per c.mm. Hæmoglobin—55 per cent. Colour Index—0.86.	4.4	No parasites seen in the stools.	

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TABLE V—*concld.*

Serial number.	Caste, age and sex.	Disease.	Blood picture.	Halometric reading.	Other findings.	REMARKS.
6	J., Hindu male, 35 years.	Kala-azar & Malaria (B. T.)	R.B.C.—2,100,000 per c.mm. W.B.C.—5,625 per c.mm. Diff. count. Poly.—6 per cent. Lympho.—25 per cent. Hyaline—8 per cent. Eosin.—5 per cent. Hæmoglobin—45 per cent. Colour Index—1.07.	4.2	No parasites seen in the stools.	Pernicious type. Showed both L. D. bodies and B. T. parasites. Urea stibamine and aldehyde tests +++. Normoblasts and megaloblasts present in blood.
7	P. D., Hindu male.	Malaria (B. T.)	R.B.C. — 337,000 per c.mm. W.B.C.—7,176 per c.mm. Hæmoglobin—60 per cent. Colour Index—0.9.	4.4	No parasites seen in the stools.	
8	R., Hindu male, 25 years.	Ankylostomiasis.	R.B.C.—1,712,500 per c.mm. W.B.C.—6,562 per c.mm. Hæmoglobin—25 per cent. Colour Index—0.9.	4.4	Stool shows:—hookworm ova, ++++; ascaris ova, +++.	

It is seen here that 2 out of 8 patients had a colour index above 1, and nucleated red cells in the blood, indicating pernicious anæmia and those 2 persons had a halometric reading of 4.2.

The other 6, though undoubtedly anæmic as can be inferred from the percentage of hæmoglobin, etc., were not of the pernicious type, having a colour index of less than 1. They had a halometric reading from 4.3 to 4.4.

Though it is unwise to draw definite conclusions from so small a group of cases, yet one cannot but observe that in this small group of Indian patients those who had anæmia of the pernicious type showed a halometric reading of *less than* 4.3, while other patients, also anæmic, but not of the pernicious type, had a reading within the range of 4.3 to 4.5 which we have assumed to be the Indian normal; thus incidentally justifying our assumption as correct.

Here questions arise. If the Indian normal reading is between 4.3 to 4.5, then it follows that the red blood cells of Indians are bigger in diameter than those of Europeans (*vide* Table I)? What leads to such a change in the red blood cells? Is it because the Indian blood is more hydræmic (watery), or is the pH of Indian blood more towards the acid side than that of Europeans? "If the H-ion concentration of the blood rises the size of the corpuscles increases"—(Samson Wright in *Applied Physiology*).

Lastly, is it faulty diet which leads to hydræmia, or changes in the H-ion concentration of the blood, if there are any such abnormalities?

Further investigations and findings on a larger group of subjects will be published in a subsequent paper.

The junior writer is grateful to one of his house physicians Sj. Ratneswar Bhuyan, L.M.P., for his indispensable assistance.

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A CASE OF TONSILLAR CALCULUS.

By M. R. SHAH, S.M.S.,
Officer in Sub-charge, Civil Hospital, Godhra.

A PATIENT attending the out-patient department was suffering from enlargement of the left tonsil. The tonsil was as large as a betel nut and was congested. The condition appeared to be a tonsillar or peri-tonsillar abscess. When incising the tonsil something gritty was felt below the edge of the knife. On separating the margins of the wound by means of a pair of forceps, a concretion of the size of a small betel nut, irregularly

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oval in shape and weight 80 grains, was shelled out. Evidently this concretion must have formed in one of the tonsillar crypts.

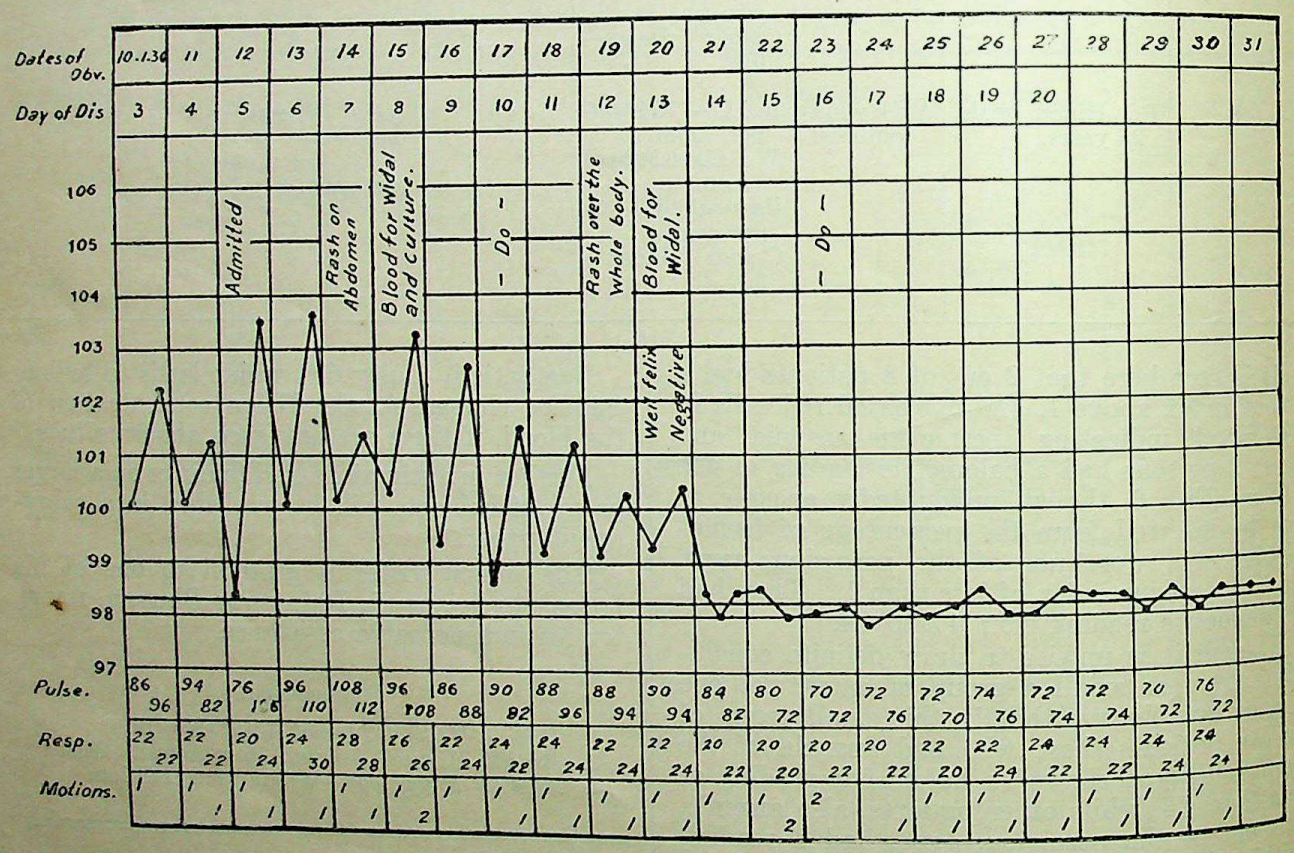
The excuse for sending this report is the rarity of the condition.

The case is reported by kind permission of the Civil Surgeon.

A CASE OF TICK TYPHUS IN POONA.

By M. N. PAI,
CAPTAIN, I.M.S. (T. C.).
Indian Military Hospital, Poona.

IN the *Indian Medical Gazette* of December 1928 I reported on two cases of tick typhus which occurred in the lines of the 2nd Lancers at Ghorpuri a village three miles from Poona. The following case is of more than passing interest inasmuch as it occurred in almost the exact place and under identical conditions.



Like the previous two cases this man is also a sowar but belonging to the 3rd Cavalry who have replaced the 2nd Lancers at Ghorpuri. This sowar had arrived in Poona only about seven months previously having been newly recruited.

Net Ram reported at the Indian Military Hospital, Poona, on 10th January, 1930, his complaint being fever of two days' duration. His tongue was coated with thick fur, throat congested and both his tonsils were enlarged. He had no enlargement of liver or spleen but had a tiny little sore like the bite of an insect on his left little finger. No malarial parasite was found and there were no blood changes worth mentioning. On 14th January, 1930, the typical dark rash appeared on the abdomen and rapidly spread to the chest. By about the twelfth day of the disease the whole body including the soles of the feet and the palms of the hands was covered with the rash and the temperature began to come down by lysis.

His blood and urine were sterile on several occasions, Weil Felix reaction was negative and no bacteriological evidence was obtained in favour of paratyphoid. The course of the disease in no way resembled septicæmia.

The progress of this case was exactly similar to those cases (which occurred at Saugar) described by Major-General (then Lieut.-Colonel) Megaw in the June number of the *Indian Medical Gazette*, 1928.

The patient made an uneventful recovery. But the rash remained prominent particularly on the soles of the feet and the palms of the hands for some weeks after the disappearance of all symptoms. It is presumed that like the two previous cases this patient might have been infected through the small sore on his left little finger while grazing his horse.

My thanks are due to Lieut.-Colonel F. B. Shettle, O.B.E., I.M.S., Officer Commanding, the Indian Military Hospital, Poona, for his valuable help and permission to publish the notes on this case.

A CASE OF ACUTE PULMONARY ŒDEMA IN AN ADULT, AS THE RESULT OF A SCORPION STING.

By H. T. INCE, L.M.S. (Lond.), I.M.D.,
Superintendent, Wellesley Sanatorium Jail, and Medical Officer, Alipuram Central Jail, Bellary.

A HEALTHY adult male Moplah convict, aged 30 years, confined in the Alipuram Jail, Bellary, was stung by a scorpion on the little toe of the right foot at about 12 midnight on 26th June, 1930. Within about five

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minutes of the sting, he complained of a severe burning sensation on the top of his scalp and became semi-conscious. He was admitted to the jail hospital almost immediately after the sting. On examination he was found to be very restless, collapsed, and presented all the signs and symptoms of acute pulmonary œdema. The frothy serous fluid which was coughed up was blood-tinged.

No local treatment was given as it was apparently too late for this. The collapse was treated in the ordinary manner with hot packs, blankets, subcutaneous injections of liquor adrenalin (1 : 1,000) and camphor in oil (3 grs. of camphor). Brandy and glucose were given orally. In spite of this, subcutaneous saline had to be resorted to, and 2 pints of saline solution (120 grs. NaCl. to 1 pint) were given in both axillæ. This was given very slowly on account of the lung condition. The pulmonary œdema was treated with subcutaneous injections of atropine and morphine. The lung condition cleared up very well, but the improvement in his general condition was very slow. By the evening of the 27th June his lungs were quite clear, but the whole of that day and the next, he was in a very toxic condition, the temperature reaching 103°F. on both of these days. On the 29th the temperature commenced to drop and the patient's general condition was also much better. His temperature touched the normal line on the 30th and from that date he made an uneventful recovery. No special treatment was given on the 27th, 28th and 29th. The treatment on these days consisted of an alkaline diaphoretic mixture and attention to the bowels.

Remarks.—The Ceded Districts are notorious for scorpions, and fatal cases of scorpion sting in children have been reported. As far as can be ascertained, pulmonary œdema has never occurred in any case. The case seems to be of more than usual interest for two reasons (1) the unusual severity in an adult, and (2) the lung condition—acute pulmonary œdema.

Special Articles.

IMPRESSIONS OF SURGERY IN AMERICA.

By W. L. HARNETT, M.A., M.D., F.R.C.S. (Eng.),
LIEUTENANT-COLONEL, I.M.S.,
Professor of Surgery, Medical College, Calcutta.

(*Based on an address given to the Calcutta Branch of the British Medical Association on 7th March,* 1930.)

The medical visitor to the United States who wishes to see something of the work of the great surgical clinics should arrange his programme beforehand with the help of someone who "knows the ropes." Medical colleges in America close for the summer vacation earlier than is the custom in Europe, the professors and leading surgeons betake themselves to holiday resorts or visit Europe and the heat in the cities of the Eastern States is very trying during the summer months. There is work in plenty going on all the year round of course, but the visitor, who has endured a long and hot railway journey to a city whose climate reminds him of Calcutta in April, will be not a little disappointed to find that the surgeon he has come to see has just handed over his duties and gone on vacation. Officers on leave from India who travel by the Pacific route will be tempted to linger in Japan, the Hawaiian islands and the delightful resorts of the Pacific coast, and will then take the Mayo Clinic on their way across the continent. There they will find so much to interest them, that they will certainly stay longer than they intended and are very likely to find that they arrive in the Eastern cities too late, unless they bear in mind that they should reach these places before the end of May.

The Mayo Clinic at Rochester, Minnesota, is the point for which all surgeons will make first if they arrive on the Western coast of America. The railway journey looks complicated when planned out on a small scale map, especially as the agents on this side are apt to mix this destination up with Rochester, New York, where the Kodaks come from. Actually it is a simple matter, as it is conveniently reached from Chicago, a point at which most of the transcontinental trains stop, and the journey has to be broken in any case. A special train with arrangements for invalids at the station and on the train runs from these to Rochester every night and similar trains appear to run there from all points of the compass, pouring a daily stream of patients into the Clinic. From 100 to 150 new patients register daily and Rochester, a rather uninteresting small town of the middle West in the centre of a dairy farming district, practically exists for and by the Clinic.

The Mayo Clinic commenced from humble beginnings. The father of the two famous brothers first went out about 1845 as a chemist, in the early days of the colonisation of that area, and took his medical degree later in America. To-day his sons are known to all America as "Dr. Will" and "Dr. Charlie" without any necessity to affix a surname. "Dr. Will" now does no operating, but is the official head of the whole organisation, "Dr. Charlie" is still on the list as an operating surgeon. The two brothers first started in partnership with their father as general practitioners in 1883, and a temporary hospital, which was fitted up to deal with casualties resulting from floods, was the first beginning of the Clinic. Up to about 1907 the two brothers with some assistants carried out approximately 3,000 operations a year; to-day 24,000 operations are carried out every year and the names of the surgical specialists on the staff are famous the world over. The Mayo brothers, however, remain of opinion that a general surgeon should be a general surgeon, and although the diagnostic work is highly specialised, it is only recently that certain surgeons have concentrated on special lines to a great extent. Even now gynæcology is not

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a special department. The original St. Mary's Hospital has expanded out of recognition, other hospitals have been added, hotels have been taken over and converted into hospitals; a huge hotel has been built, of which the lower six floors are ordinary hotel accommodation, the next four are a private hospital, the eleventh floor accommodates the pathological and basal metabolism laboratories, and the top floor consists of operating theatres. The Clinic itself is for diagnostic and administrative work only and has just been rebuilt. It is a magnificent building of 15 stories in the latest style of American architectures. In the basement are the drug stores and the laboratories for gastric analysis, the ground floor is a huge central waiting hall surrounded by the registration and record offices, above this are the *X*-ray department and some of the laboratories and then come a series of floors on the same pattern, a central waiting hall comfortably furnished with enquiry offices on either side for making appointments, directing patients and filing records of cases still under investigation and the consulting rooms of the physicians and surgeons in the wings. At the top of the building are the library and reading rooms, an assembly hall and the offices of the Director on the fifteenth floor, remote from all noise and distraction. Various special departments are accommodated in the surrounding buildings, but all are connected by subways which radiate from the elevators in the basement, so that patients can pass from one department to another, if necessary in a wheeled chair, without having to go outside.

The Clinic controls in all about 1,500 beds, of which 750 are for surgical cases and the balance are medical, special and convalescent. Patients are not admitted to hospital, except in urgent cases, until the whole of the investigation of their cases is completed. Whilst this is going on they live in one of the numerous hotels or boarding houses adjoining the Clinic, attending daily by appointment. They are admitted only just before operation and as soon as they are fit to live outside they are discharged to resume hotel residence and daily attendance, until the treatment is finished. Under no other system would it be possible to handle some 60,000 patients annually and perform about 24,000 operations with the comparatively small number of beds available. Compare this with the waste involved by our system in India which necessitates the occupancy of a hospital bed during the whole period of preliminary investigations.

The town of Rochester has about 6,000 inhabitants, and as many more "transients," e.g., patients and their relatives temporarily resident in the place. The staff of the Clinic consists of about 150, together with about 300 "Fellows." Fellows are recently qualified men who have done a house appointment, and their tenure is for three years. They are non-resident, and the salary is only $600, $700, and $800 a year in each year, or from £120 to £160. There is a tremendous run on these appointments by graduates of all the Universities in the United States owing to their very great value in training, but few of the Fellows ultimately end up on the senior staff of the Clinic, they prefer to set up in practice elsewhere, or to obtain teaching appointments at other big institutions. In every instance the newly appointed Fellow has first to go for six months to the general diagnostic section; then for six months to the section of general pathology; only after this preliminary year is he allowed to proceed to any of the specialist sections.

The patient, on admission, goes first to the central registration office. He cannot lose his way, for everywhere there are sign posts, and enquiry bureaux. He usually brings a letter with him from his own doctor, and when he finally leaves the Clinic, a letter about his case is given to him to take to his doctor. Follow-up forms to be filled in are posted six months later, and, if necessary, at still later intervals.

From the central registration office the patient is next directed to the general diagnostic section. Here he receives a card instructing him to take the elevator to the drug store which is situated in the basement. On presenting this, he receives a brown paper parcel for which he pays 15 cents. When he gets back to his hotel and opens this, he finds that it is a sterilised container into which he is to pass his urine the next morning, with a card telling him where to go next day. The general routine tests follow as a matter of course. The Wassermann reaction of every patient is tested, no matter what he is suffering from, or what his previous history is.

After these preliminary routine tests, the patient proceeds to the general diagnostic section. Here there are four or five Fellows attached to each physician. The patient is now overhauled from A to Z by one of these Fellows, and a most exhaustive general case history sheet is filled in. The object of this preliminary, but extremely thorough overhaul, is that nothing important in connection with the case may be overlooked.

Armed with the reports on the preliminary routine examinations and the result of the general overhaul by the Fellow, the patient next reaches the Chief of the section. The Chief now re-examines the patient, and it is decided what special examinations, clinical or pathological, are necessary. This does not mean that the patient is admitted to the Clinic. He will go on living in his hotel and attending daily for the special examinations. A series of cards will be given to him directing him to the various sections selected, at each of which an appointment will be made for him. The results of these examinations are returned to the general diagnostic section and attached

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to his case sheet. A gastric case for example will receive appointment for a blood count, an examination of the fæces, a test meal, a fractional gastric analysis if necessary and for a barium meal. In each case the patient receives a card giving detailed instructions as to his preparation and the actual examinations are carried through smoothly and rapidly, but without appearance of hurry.

Very large numbers of gastric cases are examined by the barium meal, but the technique used avoids any waste of films, as a series of radiograms is only taken in cases which show organic lesions by fluoroscopy or are doubtful.

The barium meal is administered at 1-30 p.m. and the stomach and duodenum are examined by direct fluoroscopy. The writer was much impressed with the speed and thoroughness of these examinations, the examiner did not hesitate to palpate the stomach with his bare hand and claimed that the apparatus was so well protected that this involved no risk. Forty patients could be examined in two hours, and far more reliance is placed on direct fluoroscopy than on photographs. *All* the routine work in the Clinic is done by "technicians." These spend their time at their one task, and become extraordinarily expert at it. The writer has never seen finer sections than those turned out by the general pathological department. In the *X*-ray section collections of films for the day are examined and read at 11-30 a.m. and 4-30 p.m., and the expert diagnosis and opinion is given so rapidly that the visitor has hardly time to study the films himself. When cholecystography is indicated, the dye is given orally and no detail of preparation is omitted in the instructions given to the patient, even to the administration of the necessary enema. The patient is again directed to the drug store, pays $2 (one dollar returnable if the enema syringe is returned), with full instructions as to how to give himself the injection the next morning.

The special examinations having been concluded, the patient is re-examined by a Fellow, and again by the Chief of the Section. It is now finally decided what is to be done in this particular case. If the case is a surgical one, the patient is referred to the surgeon concerned, who is asked to report what operative measures he advises, and arrangements are then made for the patient's admission to hospital.

The daily operation list, which visitors obtain at the central enquiry bureau, usually shows from 60 to 80 operations to be performed at the various hospitals. The bulk of the major surgery is performed at St. Mary's Hospital, where there are ten operating theatres arranged in pairs. Four or five surgeons are usually at work from 8 a.m. to 12-30 p.m., each with a pair of theatres, so that he can leave his first assistant to sew up the wound, wash up and change his gown and mask in the intervening room, and walk into the neighbouring theatre to find the next case anæsthetised and ready for the operation to be commenced. Anæsthetics are administered by nurses specially trained, with a member of the staff of anæsthetists doing the local anæsthesia cases and generally supervising the work of the nurses. Ethylene and oxygen, gas and oxygen and open ether are the favourite anæsthetics. The former are administered by a machine fitted with pressure gauges and valves which allow of very accurate control of the percentage of the gases, ether may be added when necessary. The anæsthesia appeared to be very satisfactory, muscular relaxation was good and recovery rapid with few unpleasant after-effects. Local anæsthesia by field and nerve block is largely used and an anatomical department, with a dissecting room, is maintained to enable Fellows interested in this branch to bring their knowledge of the anatomy of the nervous system up to date. There is a large pathological laboratory with a staff of assistants under the supervision of Dr. W. C. MacCarty adjacent to the theatres. The technique of cutting sections of fresh unfixed tissues has been brought to such perfection that the surgeon can be furnished with a report on the nature of a tumour within five minutes. These sections, stained with polychrome methylene blue, give very beautiful histological pictures, so that it is never necessary to make two stages of an exploratory operation, the biopsy is completed within a few minutes and the main operation proceeded with.

A representative of the radiological department attends in the theatre and gives a brief demonstration of the *X*-ray findings, with the aid of an illuminated screen, before the operation is commenced. It is his duty to record the findings on opening the abdomen and to communicate them to his department for the purpose of checking the *X*-ray report. It is largely due to this system of checking results that such amazing accuracy is attained in the *X*-ray diagnosis.

The surgical work of the Clinic naturally tends to be somewhat specialised. People do not take the trouble to travel long distances for ordinary hernia or appendix operations; it is the doubtful and difficult cases and those of recurrent trouble after operation elsewhere which form the bulk of the abdominal work. The present position of gastric and gall-bladder surgery is largely due to the work of the Mayo brothers, Judd Balfour and others, whose names are world famous.

Partial gastrectomy by the Polya method is the operation of choice for all chronic gastric ulcers, whether simple or malignant. For chronic duodenal ulcer opinion is still fluctuating as to the best line of treatment, Balfour's operation of cautery excision of the ulcer with gastro-enterostomy gives a 95 per

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cent. success rate in suitable cases, but various methods of partial resection and plastic operations are continually being "tried out" in the endeavour to obtain still better results. It was interesting to learn that only some 40 per cent. of the cases diagnosed as duodenal ulcer were referred to the surgeons, showing that the staff of the Clinic are not rabid advocates of the treatment of all these ulcers by surgical methods. Gastro-jejunal or jejunal ulceration after gastro-enterostomy for duodenal ulcer is frequently met with, though the incidence in cases operated on originally in the Clinic is low. Where the original ulcer has healed it is treated by undoing the anastomosis and enlarging the pylorus if necessary, otherwise by partial gastrectomy. As some 16,000 gastric operations have been performed in the Clinic in the last ten years, it follows that the surgeons there have had exceptional opportunities of dealing with this difficult condition.

All these cases are very thoroughly searched for focal infections before operation and for this purpose a dental department is maintained. Teeth are not extracted in the ordinary way in these cases, but are "surgically" removed, that is the surrounding septic area is removed with the tooth, as it is found that after ordinary extraction the gum may heal over, leaving the septic granulation tissue still *in situ*.

Cholecystitis is regarded as a focal infection of the wall of the gall bladder, calling for cholecystectomy in all cases. An interesting feature of this branch is the number of cases of operation for reconstruction of the bile ducts, which are necessitated by injury to the common bile duct at previous operations performed elsewhere.

For carcinoma of the rectum a two-stage operation, somewhat on the lines of that of Lockhart Mummery is favoured, the abdomino-perineal method being reserved for cases of growth high up.

Goitre is very prevalent in that part of the United States bordering the Great Lakes, with the result that very large numbers of cases of exophthalmic goitre and toxic adenoma are passed through the Clinic. It is hardly necessary to add that the pioneer work of Plummer and that of Kendall later, all carried out at the Clinic, have given the world the key to the true pathology of these conditions. Pre-operative preparation with repeated observations of the basal metabolic rate is very carefully carried out and, with improved operative technique, has brought the operative mortality down to 1 per cent., though most difficult cases and very bad risks are tackled. The greater part of one hotel hospital is devoted to this work and it is not uncommon to see six or eight operations for these conditions in a single afternoon. The anæsthesia is either local or local combined with gas and oxygen; if the latter the patient is allowed to recover for a few moments, after one side has been operated upon, in order that the operator may make sure that the recurrent laryngeal nerve has not been injured, before proceeding to do the other side. The operation performed is bilateral resection of a large wedge, leaving a slice of thyroid attached to the trachea and is similar to that performed by Dunhill. Radiation treatment is not used in cases in which operation is to be performed, as it causes fibrosis which increases the difficulties of the subsequent operation.

Periarterial sympathectomy is an operation which has fallen out of favour in the United States, as the results are found not to be permanent. Cases of thrombo-angiitis obliterans are seen in considerable numbers and good results are obtained from the operation of resection of the lumbar sympathetic ganglia, which abolishes the element of spasm and so averts the onset of gangrene. For Raynaud's disease trial is being made of the operation of resection of the cervico-dorsal sympathetic ganglion, the approach to which is by a resection of the vertebral end of the second rib, a difficult and delicate operation. Some interesting work is being done on the treatment of cerebral diplegia by these methods and the results appear promising, but recently a report has appeared in London on some selected cases of this disease in which the operation of ramisectomy was performed by Royle himself, the end-results of which have proved very disappointing.

The special departments of the Clinic are full of interest, but space will not permit of detailed reference to them. In the urological section a special feature is the daily conference, at which the notes of the cases dealt with that morning are read by the assistants, the radiograms and pyelograms are placed on a long lighted screen at the end of the room and the case is then fully discussed by the Chiefs of the Section before the report is framed. Only operations which can be performed through the cystoscope are done by the surgeons in charge of this section, all the major kidney and bladder work is done by the general surgeons. It is the same in the section of proctology; the surgeons there do the operations for hæmorrhoids, fistula and other minor cases, but the carcinoma cases are turned over to the general surgical department. An amazing number of sigmoidoscopies are done and for this purpose the inverted position is used. The patient is strapped to a Hane's table, which can be quickly tilted, so that the patient is inverted and is unable to see that several visitors have in the meantime entered the room, to withdraw after a glance down the proctoscope and a few whispered words of explanation from the surgeon. In all departments of the Clinic one noticed the consideration shown for the feelings of the patients, the fact that they were private patients who were paying for

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their consultations was never overlooked, and when visitors were allowed to witness the examination of a conscious patient it was usual to introduce them by name, so that the patient obtained the impression that a distinguished stranger, whose opinion was of value, had been drawn into the discussion. The proctoscopes used are simple open tubes of varying lengths with a lamp at the distal end, a suction tube attached to a water tap removes all fluids and leaves a clear field.

The weekly staff meetings of the Clinic are not ordinarily open to visitors, but the writer had the privilege of attending as a guest of one of the surgeons. At these meetings a summary of the clinical history of every case which has died in the hospitals during the past week is thrown on to the screen, the post-mortem specimens are demonstrated by the Chief of the Section of Pathological Anatomy, photomicrographs of sections of the affected organs are projected and the case is then discussed with a fullness and frankness which would not be possible if visitors were freely admitted. These discussions are amongst the most valuable features of the Clinic and afford the junior members of the staff opportunities not to be had elsewhere of hearing expert criticism of lines of treatment.

The visitor to the Mayo Clinic cannot help being struck by the combination of scientific methods with business efficiency which obtains there. No investigation which might throw light on the patient's condition is omitted, every possible loophole for error is closed and no effort is spared to give the patient the most efficient service in the shortest possible time.

The Clinic has now taken a definite place in the scheme of American medical education. The Mayo Foundation was endowed by the Mayos in 1915 out of the profits of the Clinic, and the endowment fund is now valued at about two million dollars. The interest on this fund pays the salaries of the Fellows and the Clinic is recognised as the post-graduate medical school of the University of Minnesota. The Fellows are all expected to take the degree of M.Sc. of that University, by thesis or examination, in some branch of medicine, surgery or applied science. "Higher" degrees in medicine have not, up to the present, been looked on with favour in America, but now that a start has been made, other Universities will doubtless follow.

From Rochester it is an easy journey to Crile's Clinic at Cleveland, Ohio, but the writer was unable to visit this institution, as the terrible explosion due to the spontaneous combustion of stored *X*-ray films had occurred a few days before he was due to arrive there and had temporarily dislocated the work of the Clinic.

At Baltimore the writer was engaged mainly in a study of the system of medical education at Johns Hopkins University, but many visits were paid to Professor H. H. Young's Clinic at the Brady Urological Institute and to the general surgical practice of the Johns Hopkins Hospital. Young is the great exponent of the *perineal* method of prostatectomy, a difficult operation, but the technique has been brought to such perfection that the mortality in 1,049 cases was only 3.4 per cent., a figure which has not yet been reached by any other method. Renal function is estimated by the phenolsulphonephthalein test, with the aid of a very simple colorimeter of Young's own invention, which enables the test to be done very rapidly in a room adjoining the consulting rooms. Each patient is seen in a separate room by one of the assistants, the tables are fitted with *X*-ray tubes operated from a central switch-board in charge of a technician, who appears in answer to the ring of a bell as soon as the ureteric catheters are in position, adjusts the tube, makes the exposure and has the developed films on view in the conference room ten or fifteen minutes later. The Professor goes from room to room, seeing the cases as soon as the notes are completed, checks the cystoscopic findings and dictates his own notes on the case, thus getting through an immense amount of work in a short time. As in many other centres in America, he sees his private cases in the hospital and operates there only.

Professor W. E. Dandy who introduced the method of pneumo-ventriculography is on the staff of Johns Hopkins, doing all the brain surgery. His special line of work is the treatment of hydrocephalus cases. His operation of excision of the choroid plexuses is a most spectacular proceeding, but so far no one else has been successful with this method. The rapidity with which an expert can tap the ventricles through a small burr hole on either side of the mid-line of the skull is very striking and, by thus reducing intra-cranial tension before opening the skull, many of the difficulties in approaching a cerebral tumour due to the bulging of the brain through the opening in the cranium are obviated.

In New York all branches of surgery can be studied and the Post-Graduate College offers excellent facilities for taking out special courses of instruction. To the visitor bent on seeing as much as possible in a limited time New York is a most exasperating city. Distances are great, the hospitals are widely scattered and the transport problem is awful. The American Medical Association is most hospitable to visitors and will mail a list of the operations to be performed each day in the principal hospitals to any visitor at his hotel. Unfortunately operations usually start at 8 a.m. and the list rarely arrives by the first post. Taxicabs, buses and trams are held up by the traffic signals at every block, progress is exasperatingly slow, and distances are too great to be walked in the heat of a New York summer.

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The "subway" is packed to suffocation in the rush hours, there is no system of signalling the destination of approaching trains as in London, the express and slow trains run on separate lines and even old New Yorkers admit that they occasionally get into the wrong train. However he elects to travel, the stranger is quite likely to arrive hot and tired, an hour or more late and if, having lost his way, he starts enquiring from passers-by he will find that it is not always easy to strike someone who can understand his language. Still in spite of these difficulties the writer managed to see Albee, who is surely one of the finest craftsmen in the surgical world, doing some of his operations for spinal tuberculosis and extra-articular arthrodesis, Hibbs, whose method of spinal fixation is quite different from Albee's, and Whitman, one of the fathers of orthopædic surgery. The new medical centre at the Columbia University is one of the very latest hospitals in the U. S. A. and is well worth a visit merely to go over the buildings.

Boston is a great contrast to New York, there are no sky-scrapers and the rush and hurry of New York are here toned down to an atmosphere more akin to that of European cities. Harvey Cushing's Clinic is the great attraction and here too are Osgood and Legg doing fine orthopædic work, especially in the surgery of infantile paralysis. Officers of the I. M. S. are sure of a warm welcome from Harvey Cushing, who met many members of our service during the war and has a high opinion of the work of the I. M. S. in India. He personally examines every case before operation with meticulous care, checking every detail of the clinical history and findings. Local anæsthesia is always used for cranial operations and a large osteo-plastic flap is turned down by the burr and Gigli's saw method, which appears to be preferred by all American operators to motor saws. The excision of brain tumours is done by the diathermy knife, working from an improved machine which furnishes current of very high frequency, so that the section is practically bloodless. A suction apparatus is always at hand, with which minor hæmorrhage from the brain can be quickly checked, by placing a piece of moist wool on the bleeding spot and then touching with the aspirator. His results are remarkable, 25 per cent. of recoveries in glioma, a disease which is inevitably fatal without operation, and 60 per cent. of recoveries in meningioma. The operation of resection of the sensory root of the Vth cranial nerve is carried out in large numbers of cases in all the neurological clinics for the relief of trigeminal neuralgia, for which it has entirely replaced excision of the Gasserian ganglion. Alcohol injection of the peripheral branches is done first, to accustom the patient to hemianæsthesia of the face and because a certain number of cases are permanently cured thereby. The opening made in the skull is very small, little more than one inch in diameter, and the secret of the technique lies in the use of a special retractor with an electric light at the end for elevating the temporo-sphenoidal lobe. Ligature of the middle meningeal artery is the most difficult step of the operation.

The shortness of our stay in Boston rendered it impossible to devote the time it merited to the work of Prof. Osgood and his colleagues. The physiotherapeutic department under the supervision of Dr. Legg was carrying on the after-treatment of cases of anterior poliomyelitis and was obtaining really remarkable results, which were charted in such a manner that the progress of the case could be regularly followed. Operations for the stabilisation of the paralysed joints and for lengthening of the shortened limb were a special feature of this department.

From Boston a comfortable over-night journey lands one in Montreal, in a province where there is no prohibition and the consumption of alcohol in public is not an offence against the law as in America. McGill University had closed down for the summer vacation.

So there was nothing to be seen of Prof. Archibald's work in brain and thoracic surgery, which, especially in the latter branch, has attracted so much attention lately. The buildings of McGill are very picturesque and Montreal is an attractive city, more French than English; the excellent wines obtainable there are very pleasing to the palate after three months in a "dry" country, and there is the beautiful voyage down the St. Lawrence river, with a glimpse of Quebec *en route*, all combining to make it a very satisfactory jumping-off port for the return to Europe.

NOTES ON EPIDEMIOLOGY WITH SPECIAL REFERENCE TO THE ROLE OF THE BACTERIOPHAGE IN PUBLIC HEALTH.

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CERTAIN phenomena of infectious disease are of intense importance and interest to the sanitarian. I refer particularly to the phenomena accompanying epidemics, their origin, their rise and their decline; and to the mechanism of recovery and immunity in cases of infectious disease. One aim which the sanitarian and health worker has in view is the prevention and eradication of infectious diseases and epidemics arising from them. The problems of epidemic occurrence and of recovery and immunity are amongst the most puzzling and elusive in public health work, and it is not surprising that from the earliest time theories and conjectures concerning them have been propounded, and it is

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perhaps a tribute to the first great thinkers and a reflection on the dearth of imagination of modern workers that many modern students of epidemiology should be reverting to the views of the earliest theorists. It may not be amiss to mention shortly the various views that have been expressed on the phenomena of epidemics and immunity.

The Deistic idea is still prevalent in primitive peoples and is not so far away from the surface possibly in civilised countries as we might imagine. Hippocrates in 400 B.C. was probably the first to apply reason to the phenomena of disease and epidemics. He conceived a relationship between habit, physique, weather and disease and an epidemic type or state called *katastasis* brought about by the concurrence of certain weather conditions. Exactly what he meant by *katastasis* is open to some doubt. Varro about 40 B.C. made a distinct addition to the theory by the conception of minute bodies *animalcula quaedem minuta* arising from marshes or ponds and entering the body by way of the mouth and nose and then causing disease.

Galen (160 A.D.), the last of the great Greek physicians, followed Hippocrates in his teaching of atmospheric influence. Fracestor in 1546 crystallised the precise idea of infective agents and the modes in which they might be carried and spread disease. Sydenham about 1660 revived the Hippocratic ideas and coined the phrase "epidemic constitution" regarding fevers and epidemics. He divided the fevers into stationary and intercurrent fevers. The stationary fevers depended on the "epidemic constitutions" of atmospheric conditions, and the intercurrent fevers on other influences such as temperature, rainfall, winds and airs. "Constitutions" caused different diseases—Sydenham recognised seven constitutions in his own time. Like Hippocrates' *katastasis*, what Sydenham meant exactly by the term "epidemic constitution" is not very clear. The "constitution" might vary from time to time and its particular state at that time would determine the "stationary fever" prevalent, which at one time might be smallpox, at another ague, and so on. This idea has been revived to some extent by Hamer and Crookshank. Sir William Hamer is a devoted admirer of Sydenham and perhaps reads more into Sydenham's writings and ideas than the average man can appreciate or even than Sydenham meant himself. Hamer's views are a protest that laboratory methods have at present obscured the broader issues of epidemiology and that we need to go back to Sydenham's methods of studying disease and epidemiology on the broad basis of natural history and by a historical method of approach rather than by a study of minute details in the laboratory.

Pasteur of course opened the door of approach to the study of infection from the side of the infective agent. William Farr from 1870 onwards presented the first scientific study of epidemics by mathematical statistical methods and showed that epidemics in general followed a curve similar to what is now known as the "normal curve" and he gave an equation with certain constants similar in form to the equation of the normal curve. A similar equation can be deduced on the assumption that the tendency to infections, starting high at the beginning of an epidemic, decreases in units of time in geometrical progression. Gill in his *Genesis of Epidemics* envisages an "infection quantum" in disease, and epidemics start when the "infection quantum" increases and at the same time the "immunity quantum" decreases. He bases his ideas on the phenomena preceding and accompanying fulminant epidemics of malaria in the Punjab. Within recent years the most fruitful advance has been a combination of experimental and observational methods. We owe these mainly to Topley, Greenwood, Webster and Dudley. Topley and others by experimental methods in herds of mice have shown that for the continuance of an epidemic of mouse typhoid in a herd, the introduction of susceptibles is an essential and that the characters of the epidemic are largely influenced by the numbers and the rate of immigration of susceptibles. Further, the evident cases of typical clinical disease may be a very small proportion of the total cases actually infected, and sub-clinical infections are common. Dudley by observing (during epidemics of diphtheria and during inter-epidemic intervals) the number of actual cases of diphtheria, the number of sub-infective cases (temporary carriers), and the number of susceptibles and non-susceptibles, confirmed Topley's views as to the recrudescence of epidemics by the introduction of susceptibles. Further he assumed that a minimum quantum of the infective agent was necessary to produce evident disease and that this quantum might be delivered to the recipient all at once, or by driblets at intervals of time, until the sum of the portions reached the necessary amount to produce disease. Sub-infective doses however were dealt with and destroyed by the body at a definite rate. As Dudley states, if V is the amount of infective material delivered per hour and U the amount destroyed by the recipient per hour; then

(1) If V—U is negative and the velocity of infection low (only at long intervals) there may not be sufficient reaction to give any acquired immunity.

(2) If the velocity of infection is slightly more rapid, acquired immunity may occur without any infection.

(3) If more rapid still, acquired immunity is obtained, but the organism can establish itself on the host = acquired immunity *plus* the carrier state.

(4) If still more rapid, disease occurs, but in atypical form and often not recognisable as such.

(5) Still more rapid—typical cases of the disease occur with recoveries.

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(6) Still more rapid or a large initial dose—disease and death.

The proportions that each of these classes may assume vary in every epidemic and inter-epidemic period and may be diagrammatically represented thus—

Fig. 1 may represent conditions at the very height of a severe epidemic, say of cholera or influenza with high mortality.

Fig. 2 represents conditions in an epidemic of cerebro-spinal fever or poliomyelitis where the typical cases bear a small proportion to the carriers.

Fig. 3 may represent the conditions in the chain of events during the course of an epidemic. In the inter-epidemic period the organism may be kept procreating by transfers in small quantities and class "A" may be only present. Later activities lead to an increasing number of class "A", then to class "C" and so on until evident cases and mortality occur. At the height of a severe epidemic the form changes, so that fatal cases may be more numerous than others; then the epidemic regresses in the same way as it waxed, until the initial inter-epidemic phase is reached again. The reasons for spontaneous genesis of an epidemic are still obscure, though loss of immunity, growth in the number of susceptibles, augmentation of the infectivity of the contagion, are all factors. The study of immunity and immunity reactions has become very technical; briefly there are two main considerations; phagocytosis or cellular reaction as originally propounded by Metchnikoff, and humoral reactions associated with the names of Fudor, Buchner, Von Behring, Pfeiffer, Bordet, Ehrlich, Wright and others and round which a large group of special words have gathered such as alexins, sensitising substance, complement, amboceptor, lysins, aggressins, opsonins, etc. There is thus a very close relationship between immunity and the phenomena accompanying epidemics.

Is the bacteriophage the agency connecting the two series of phenomena? According to d'Herelle it is, and many of the facts and observations containing support his views. The work of d'Herelle and his colleagues in connection with cholera in India is probably the most complete as regards the phenomenon of recovery, immunity and epidemiology. With regard to cholera d'Herelle claims that:—

(1) Cholera is caused by an ultra-pure agglutinable and virulent vibrio.

(2) Recovery is impossible without the development of a phage for the cholera vibrio in the patient's body.

(3) The non-agglutinable strain of vibrio is the result of phage action—that this is an irreversible mutation form except in endemic centres like Bengal. The mechanism of the reversing to an agglutinable virulent vibrio is unknown. d'Herelle suggests that it takes place in water and possibly in snails and other aquatic gasteropods. The non-agglutinable vibrio is avirulent and does not cause cholera unless it is altered in some way so as to become agglutinable and virulent. This never happens in non-endemic areas where cholera may only be epidemic.

(4) The spread of the epidemic is due to the dissemination of agglutinable virulent vibrios by cases or persons incubating the disease.

(5) The decline and cessation of the epidemic are due to a dissemination of phage by convalescents from cholera in water supplies and by flies which have fed on the stools of recovered patients containing phage.

(6) The phage makes recovery possible in a patient by destroying virulent vibrios in the intestinal mucosa.

Fig. 1.

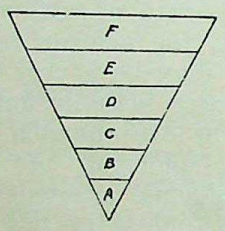
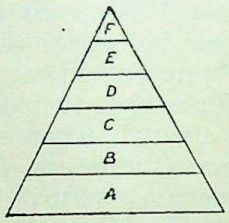


Fig. 2.



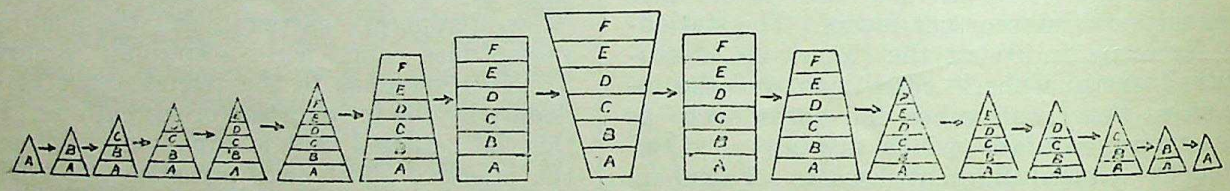


Fig. 3.

F.	..	..	Fatal cases.
E.	..	..	Typical cases not fatal.
D.	..	..	Atypical cases but suggestive.
C.	..	..	Departures from health not recognisable as the disease.
B.	..	..	Infections without symptoms (carriers).
A.	..	..	Apparent immunes.

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(7) The phage produces lysins which act as opsonins, favouring rapid phagocytosis of cholera vibrios by body cells.

(8) The protein products of the vibrios lysed by the phage have potent antigenic powers, stimulating the host to the production of anti-vibrionic bodies.

(9) Phage is present in wells and other water supplies for some time after an epidemic. In a non-endemic centre, both non-agglutinable vibrios and phage disappear.

(10) The administration of potent appropriate phage has both curative and preventive powers.

(11) Protection to individuals and communities may be given by the administration of phage and by disseminating it in water supplies, wells and tanks.

d'Herelle and his co-workers uphold these claims by many detailed observations. If these claims are true, even as regards cholera and without any further generalisation, they are of the utmost importance and deserve the closest study and corroboration and extension.

A considerable amount of work on the public health aspect of the bacteriophage has been done already. Asheshov has used it to protect against cholera at the large *melas* and fairs of Allahabad and Puri but his published results are as yet inconclusive.

Larkum (1929) states that the phage lysates of bacteria are superior to vaccines for preventive inoculation; the agglutination action is practically identical, the bactericidal action is greater, the opsonic index is higher, and the duration of the immunity longer. (On the other hand, d'Herelle himself sounds a note of warning in giving phage and lysed cholera vibrio products *hypodermically* as a remedy for cholera.) The reaction from such lysates is much less than with ordinary vaccines. Lloyd Arnold (1925) notes that the presence of phage in surface water is too variable to be used as a criterion of domestic sewage pollution, but the presence of phage in a water along with pathogenic organisms will affect the growth of these latter, a longer time being required to produce a phage-resistant strain of the pathogenic organism. Phage-sensitive pathogenic organisms in water containing phage are less likely to be the cause of epidemics than in a surface water containing no phage. He further suggests the impregnation of water filters with phage active against pathogenic bacteria, and also the utilisation of lysis from phage in sewage purification.

Bacteriophage is well distributed in nature. Dumas (1920) has found it in earth and tap water. Arloing and Sempè (1926) have demonstrated its presence even in ocean water. A large number of workers have found it in rivers, tanks and also in other polluted waters.

Regarding the part played by bacteriophage in self-purification of water there is much divergence of opinion. Some, amongst whom may be mentioned L. Arnold and F. Arloing and Nakasima (1925), think that bacteriophage plays or may play an important part in the destruction of bacteria in water, whereas Flu (1923), Zdansky (1924), and Janey (1927) doubt whether it exerts any influence at all under natural conditions. Flu (1923) is of opinion that protozoa play an extremely important part in the self-purification of water. He conducted a series of experiments to investigate the rôle played by bacteriophage and protozoa in the reduction of bacteria in water. As a result of these experiments he came to the conclusion that bacteriophage has no influence in the self-purification of water, whereas protozoa have.

Zdansky also suggests that sensibility towards bacteriophage may probably allow of differentiation between intestinal *B. coli*, and saprophytic bacteria of the *coli* group. Intestinal *coli* are lyso-sensitive and saprophytic *coli*-like organisms are lyso-refractive. We however in our experiments could not confirm this view. We have tested the action of anti-*coli* phage isolated from sewage and water against different types of *coli* organisms and have found that it can lyse organisms of the *aerogenes* group which are non-fæcal. Houston (1923) also investigated whether human and animal *B. coli* could be differentiated by phagic action. His experiments gave negative results. Nakasima examined filtrates of sewage treated by interrupted and constant flow filters. He found bacteriophage in the purified effluents, and concluded that it played a part in the purification of sewage. This has not been our experience.

In the Bengal Public Health Laboratory we have for some time been conducting observations on bacteriophage from the public health point of view. In a paper read before the last Congress of the Far Eastern Association of Tropical Medicine, I pointed out that the activated sludge process of sewage purification had a very definite germicidal action on sewage organisms, the more delicate (Class I Clemesha's) organisms being killed off first, the more resistant class (Classes II and III Clemesha) persisting much longer. As the result of further work Dr. Ghosal and myself published further findings (*Indian Journ. Med. Res.*, Vol. XVII, April 1930) showing that the bactericidal action of the activated sludge process is not due to any enhancement of the bacteriophage originally abundantly present in the sewage, but that both phage and bacteria get killed off by the process; no consistent diminution of phage occurs before 6 hours' aeration; in this respect it differs from germicidal action which is progressively active from the first hour. Roughly after 6 hours' aeration, the reduction of phage is about 90 per cent., some resistant phage strains being unaffected. After 24 hours' aeration however there is nearly 100 per cent. reduction, most of the phage races being completely destroyed.

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Since this, we have continued our observations on more general lines, examining samples of raw water, settled water, and filtered water for the presence of phage.

To investigate these points a large number of samples of water from waterworks in different parts of Bengal were examined in the laboratory.

The following procedure was adopted:—In order to make a comparative study three samples from each waterworks were examined for lytic action, one from the raw water, one from the settling tank, and another after filtration.

Virulence against the following organisms was noted:—

(1) *B. shiga.*
(2) *B. flexner.*
(3) *B. typhosus.*
(4) *V. choleræ.*
(5) *B. coli communis.*

In most of our experiments we found bacteriophage to be present in the samples of raw water against some of the organisms.

In the samples of settled water, we observed that 90 to 99 per cent. of bacteriophage originally present in raw water had been destroyed. In the samples of filtered water we were unable to detect the presence of bacteriophage in the usual way in any of the samples. In some cases phage was recovered after a few passages. The following is a typical result of our series of experiments:—

		1 in 10.	1 in 100.	1 in 1,000.	1 in 10,000.
B. shiga	1. R.	+ + + +	+ + + +	+ + + +	—
	2. S.	+ + + +	—	—	—
	3. F.	—	—	—	—
B. flexner	1. R.	+ + + +	+ + + +	+ + + +	—
	2. S.	+ + + +	+ + + +	—	—
	3. F.	—	—	—	—
B. typhosus	1. R.	—	—	—	—
	2. S.	—	—	—	—
	3. F.	—	—	—	—
V. choleræ	1. R.	—	—	—	—
	S.	—	—	—	—
	F.	—	—	—	—
B. coli	R.	—	—	—	—
	S.	—	—	—	—
	F.	—	—	—	—

R. River water. S. Settled water. F. Filtered water. + + + + = No growth. — = Full growth.

Seasonal variation of bacteriophage in Calcutta sewage.—This has been regularly examined to see whether the races of bacteriophage present change in the different seasons, if so, whether that change coincides with the diseases prevalent in the city at that time. This work is still being continued. The virulence against dysentery bacilli (Shiga and Flexner), *B. typhosus* and *V. choleræ* is all being noted. The work is still in progress. From the results so far obtained we find that the races of bacteriophage change in different seasons and also seem to have a relation with the diseases prevalent in the city. For example, we have seen that during the monsoon when dysentery is prevalent in the city and there are very few cholera cases, a phage having a marked action on dysentery bacilli is quite marked in the sewage, but cholera phage is absent. In the cold months when cholera becomes prevalent in the city, the phage present in the sewage has a marked action against the cholera vibrio.

Action of sunlight on bacteriophage.—From the experiments conducted in the laboratory it would seem that under the direct sun's rays bacteriophage is destroyed quickly.

This paper has been written with the object of drawing attention again to the very wide range of factors affecting the incidence and phenomena of epidemic infectious disease and of the necessity of investigating widely every aspect of the bacteriophage, which at present seems to offer an explanation of many phenomena in recovery, immunity and in the epidemiology of disease, especially cholera.

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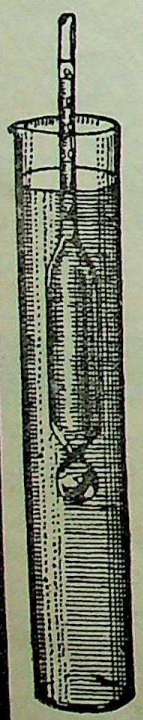

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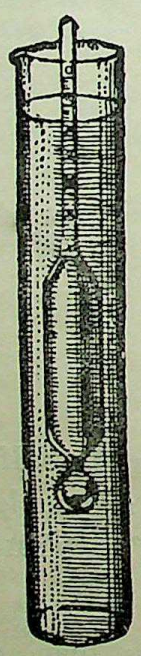

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APRIL.

THE ROMANCE OF CINCHONA.

A VERY interesting function took place in December 1930 at the Wellcome Historical Medical Museum in London, when a Cinchona Tercentenary Celebration and Exhibition was held. Through the energy of Mr. H. S. Wellcome, LL.D., the Director of the Museum, a very wide range of exhibits had been collected from all sources, and we have received with much pleasure the sumptuous catalogue-souvenir published by the Wellcome Foundation. Those who lent exhibits included King Alphonso XIII of Spain, the Royal Society, the Secretary of State for India, the Medical Research Council, the Pharmaceutical Society of Great Britain, the Royal Botanic Gardens at Kew, the Royal Geographical Society, and many distinguished foreign medical societies and institutions. It is characteristic of the Wellcome Foundation that the exhibition should have been such a successful one, and the souvenir will be one much prized by all its recipients.

The programme at the opening of the exhibition was a most interesting one. On December 8th an address was given by the Marquis Merry del Val, the Spanish Ambassador; on December 10th Sir David Prain gave an outline of the history of cinchona and the use of its different alkaloids; the same evening Sir Humphry Rolleston gave an account of the therapeutics of cinchona; on December 15th Sir Charles MacWatt (Director-General, I.M.S., 1922—26), spoke on malaria and cinchona in India; whilst at the final meeting on the same evening the speakers were Dr. G. Carmichael Low, Dr. P. Manson-Bahr, Dr. H. H. Dale, F.R.S., and Dr. C. M. Wenyon, Director-in-Chief of the Wellcome Bureau.

It may be of interest to our readers if we attempt to cull a brief résumé of the history of cinchona from the various reports and brochures issued in connection with this tercentenary, for there is no more interesting chapter in the history of medicine than that of the use of cinchona febrifuge, whilst the matter has its bearings on the question of the use of Indian indigenous drugs.

According to Valenzuela (1927) very early in the history of Peru, when the Peruvian Inca Huina Capac* invaded Ecuador, his army was decimated by malaria, but the disease was brought under control by the administration of cinchona bark. (If this record can be confirmed by further research, it is of the greatest interest, because it shows that malaria must have been prevalent in the New World before any Europeans went there. In that case the malaria of the New World must be of Asiatic origin, and must have been imported through the Behring Corridor, the climate of which in ancient days is known to have been much warmer than now. On the other hand man may not have been the first vertebrate host of the malaria parasites, which may have been present in the blood of small mammals, bats, squirrels and anthropoid apes, as well as in mosquitoes, ready to invade the blood of *Homo sapiens* as he emerged in the evolutionary tree.)

At least, it appears to be the case that the ancient Incas knew of the value of cinchona bark in the treatment of ague, although the knowledge does not appear to have been widespread, but rather confined to a few who dabbled in medicinal herbs. de Jussieu states that the Jesuits in Peru knew of the value of the bark as early as 1600. The first authentic instance of its use by Europeans in the literature, however, was in 1630 when the Spanish "corregidor" of Loxa was taken ill of an intermittent fever and was cured by an Indian cacique of Malacotos, who revealed to him the curative properties of the bark and the proper way to administer it. Very shortly afterwards the Jesuit Fathers in South America commenced to despatch small supplies to Europe, and the bark reached Spain and Rome in 1632. In 1628 the Spanish Count Chinchon married his second wife and was appointed Viceroy of Peru. (There has been considerable confusion in this matter, as many authors appear to have erroneously believed that it was the first Countess of Chinchon who imported the bark into Europe. This is not the case, as she never visited Peru.) The original records prove—according to the Wellcome Foundation brochure—that both the Count and Countess suffered severely from malaria, and that in 1638 the court physician, Dr. Juan de Vega, cured the Countess of this malady by the administration of cinchona bark at Lima. Later, the Countess died in 1641 and was buried at Carthegena in Colombia; then a province of Peru. Whether she ever imported or sent

* The history of this Inca is given by Sir Clements Markham in his translation of the Hakluyt Society series of Baltasar de Ocampo's *History of the Incas*. He was born in 1444 A.D., came to the throne in 1464, and died at Quito in 1524—leaving more than fifty sons. Columbus discovered America first in 1498, and Spanish colonisation did not commence until after 1500 A.D. It would therefore appear to be the case that malaria was prevalent in South America before the advent of Europeans to the New World.

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supplies of the bark to Europe appears to be uncertain.

Probably in a number of ways and by devious routes the bark was gradually imported into Europe, and its use in malaria became known to the few. It was variously called the "Jesuits' bark," the "Countess' powder," "the Peruvian powder," or by the indigenous Peruvian name of "quinaquina." The Jesuits used to distribute the bark free to all needy sufferers, but charged very high prices for it to the wealthy. One of the biggest importations of bark was a consignment of three "serons" sent to King Carlos III of Spain in 1777, and the old mule boxes and their original raw-hide coverings in which this consignment was sent were on view at the Exhibition. By 1658 the use of the bark was becoming known in Europe, and Sir Humphry Rolleston in his address quoted a delightful advertisement which appeared in the *Mercurius Politicus* in that year, which assured the public that the bark or powder could be obtained from Mr. John Crooks, bookseller, at the Sign of the Ship in St. Paul's Churchyard, with instructions for its use; whilst James Thompson, merchant of Antwerp, at his own lodging at the Black Spread-Eagle in the Old Bailey, also had a supply. By this time, therefore, the use of the bark had spread to the Low Countries and England.

The next important development is associated with the name of Sir Robert Tabor (or Talbor), court physician to King Charles II of England. There appear to be two diverse accounts of what happened. It is certain that he cured Charles II of an ague with the bark, and was knighted for his pains. One account states that he also cured the Dauphin of France, and and that after his death his widow sold the composition of the secret powder which he used to Louis the XIV of France for £250. An alternative account states that, for curing the Dauphin, he received the title of Chevalier of France, a pension of £100 a year, and a sum of £2,000 for the secret of his "Englishman's cure," which was an infusion of a considerable quantity of cinchona bark in good claret wine. In 1740 Linnaeus first named the genus of trees concerned under the generic name *Cinchona*, in memory of the Countess of Chinchon, but misspelt her name. The name "quinine" is derived from the American Indian name "quinaquina" used for the bark. By 1677 the bark had become officially recognised in the *London Pharmacopœia* as the "Crown bark" of Loxa; red bark appeared a century later.

The general use of cinchona bark in Europe, however, next led to serious diminution in the supplies from South America. The cinchona tree is a delicate and selective plant. It will only grow under certain selective conditions of altitude, rainfall, and sunlight, and its maximum yield of alkaloids is reached at about its eighth year of age. In South America the range of cinchona trees is from altitudes of 3,000 to 8,000 feet, and between the latitudes of 10°N. and 22°S. The "red bark" of *Cinchona succirubra* had come into general use in Europe by 1785, and by 1790 "yellow bark" from Bolivia had become popular. By the commencement of the 19th century, however, there was a serious danger lest the supplies from South America should become depleted.

The first attempt to introduce cinchona plants to Europe appears to have been made by La Condamine and Jussieu in 1739, but the whole collection—destined for the Jardin des Plantes in Paris—perished in a storm at sea near the mouth of the river Amazon. In 1846 a Dr. Weddell travelled to Bolivia and brought back seedlings of *Cinchona calisaya* which were successfully transplanted in the Jardin des Plantes. In 1849 a French expedition was sent out to the Andes and tried to transplant cinchona plants from South America to Algeria; this attempt failed however, as conditions in Algeria were not suitable for the growth of so delicate a shrub. In 1854 the Dutch sent out a very well equipped expedition to South America, which succeeded in transplanting cinchona seedlings from Peru to the Dutch East Indies—the first commencement of the immensely important cinchona industry of to-day in these islands. This gave the Dutch the premier lead and hold in the cinchona industry throughout the world.

In the meantime in 1852 Dr. Royle, reporter on Indian products to the East India Company, urged upon that body the necessity of sending an expedition to Peru to transplant cinchona seedlings from South America to India. The India Office followed the usual official policy of procrastination, and tried to obtain seedlings through the agency of the different British consuls in South America; these attempts naturally failed, though they led to the publication of four official "Blue Books." Finally, in 1851 Mr. (afterwards Sir) Clements Robert Markham, a retired naval officer, spent a year's leave in visiting Inca remains in Peru and became acquainted with the cinchona tree. After years of correspondence with the India Office he was deputed in 1859 to lead an expedition to Peru, and, accompanied by botanical and pharmacological experts and gardeners, he arrived at Lima in January 1860.

Knowing that time was of the utmost importance, Markham split his party into three sections, each to explore a different tract of territory. The expedition encountered incredible hardships and difficulties, travelling through virgin forest, attacked by wild animals, and everywhere encountering the hostility of the local tribes. A full account is given in Markham's book *Travels in Peru and India* (London, 1862).

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Under official orders Markham was prevented from bringing his plants direct from Peru to India, but had to transport them *via* Great Britain, where several of them were retained by the Royal Botanic Gardens at Kew as a reserve. The remainder were then sent on to India, but many of them perished in the climate of the Red Sea. Markham finally arrived at Calicut in October 1861 with a collection of almost moribund plants. He decided that the Nilgiri Hills offered the best prospects of success, and the earliest plantations in India were accordingly located there. Later in the same year further seedlings were imported into India from Java, and in 1862 a still further collection was imported from Loxa in Peru. Thus the Indian cinchona industry became well established, and from the Nilgiris there have developed the present-day plantations at Mungpoo, and in Burma. At first the industry was largely in the hands of independent planters in South India, but, as they found tea and coffee planting more profitable, it finally became a purely government concern. To-day between 3,000 and 4,000 acres in India are under cinchona cultivation, yielding about 40,000 lbs. of quinine a year. Even this amount however is quite inadequate to the real needs of the country, and some 50,000 lbs. of foreign manufactured quinine or bark are imported annually. It may be remarked that cinchona trees are most difficult to grow. They require certain specialised conditions of altitude, temperature, shade and moisture; they may grow well on one side of a terraced hill, and not on the other, and there is no way of testing out whether local conditions are suitable for cinchona cultivation except by trial and error. The trees give their maximum yield of alkaloids in the bark at about the eighth year of age, and once the trees have been felled cinchona cannot be grown again on the same area until it has been re-sown for a number of years with jungle.

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Turning to the history of the use of cinchona febrifuge in India, the bark appears to have been used first by the ships' surgeons of the East-India men and by "apothecaries" in the employment of the East India Company.* James Lind in 1765 treated between 400 and 500 patients in Bengal with the bark with only 2 deaths, using no less than 140 lbs. of bark. John Clark used it in epidemic malaria in Bengal in 1768—71 with very good results. William Hunter used it in India in 1804.

There followed a reactionary period, when a certain Dr. James Johnson appears on the scene. He appears to have treated only three or four cases of malaria with the bark, with disappointing results. He was in India only for some five or six years, and even then only intermittently, as he was a ship's surgeon. Yet on the strength of this he wrote a book on tropical diseases in 1813 in which he violently condemned the use of cinchona bark in malaria, and, as he appears to have had great influence with the Directors of the East India Company, the use of cinchona bark or powder was officially condemned by the Court of Directors. There ensued a chapter in the history of tropical medicine which is almost incredible. Treatment was by violent purgation with calomel in heroic doses—usually a scruple at a time,—venesection, and the administration of alcoholic stimulants to the exhausted patient. A single patient would receive from 800 to 900 grains of calomel during his attack of malaria, and the European General Hospital in Calcutta consumed 14,000 grains of calomel a month. Patients were almost salivated to death, whilst necrosis of the jaws was a very frequent event.

Despite the official orders against cinchona bark, however, Annesley used it with good effect in 1828, and William Twining re-introduced its use in the European General Hospital in Calcutta in 1835. Finally there came the general re-introduction of the use of cinchona by Edward Hare in Bengal in 1847—54. In 1847 Hare wrote a pamphlet on the treatment of malaria and dysentery, and his results were so successful that the Calcutta Medical Board ordered an official trial of Hare's method in the Calcutta hospitals. The result was to reduce the case mortality from fevers in these hospitals from 1 in 11 under the regime of violent purgation and venesection to a rate of 1 in 129.

Finally, came the Madras Cinchona Commission of 1866. The Madras Commission had to rely entirely on clinical results, of course, as the malaria parasites were not discovered until 1881 to 1890, and the different alkaloids with which they were concerned were of crude description. The Commission came to the conclusion that "quinine" was the best of the alkaloids, and from that moment "quinine" became synonymous with the treatment of malaria. (It is a little difficult to understand why the Commission turned down quinidine, with which they appear to have had better results. Apparently, they were of opinion that when once pure quinine sulphate should become available, this would be the alkaloid of choice.)

In the meantime research was being carried out on the pharmacology of cinchona bark. Quinine was isolated by Pelletier and Caventou in 1819, and quinidine by Henry and Delondre in 1833. To-day it is known that cinchona bark contains from 20 to 30 alkaloids, of which only five—quinine, quinidine, cinchonine, cinchonidine, and amorphous quinoidine—are

* This information is taken from the historical chapter in the second edition of Sir Leonard Rogers' *Fevers in the Tropics* (1910). It seems a great pity to the present writer that this most interesting and valuable chapter has been omitted from the third edition.

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present in sufficient amounts to exercise a therapeutic action. Later work by MacGilchrist (1914—16) and by Acton (1920) has shown that the alkaloids other than quinine cannot be ignored. Quinidine is probably the most active of these five alkaloids but unfortunately it is apt to cause cardiac trouble in susceptible patients; on the other hand, as it is dextro-rotatory, whereas quinine is lævo-rotatory, quinidine may be of value in the few rare patients who prove intolerant to quinine. Cinchonine is the element in cinchona febrifuge which causes vomiting, and the Java febrifuge is richer in this alkaloid than is the Indian febrifuge.

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To-day, the medical profession in India has unconsciously adopted the attitude that quinine is the only therapeutic remedy for malaria. Yet, whatever steps be taken to reduce the price of quinine, it must always remain an expensive drug. The Bombay Government imported a sample of cinchona bark in 1826 for experimental trial at a cost of £28-10-6 per lb. Before the Great War the price of quinine was tending to fall, but during the war it rose to some Rs. 26 per lb. To-day the current retail rates are Rs. 18 per lb. for quinine sulphate and Rs. 10 per lb. for cinchona febrifuge.

Is it not time that more attention was paid to the use of the cheaper cinchona febrifuge? In our issue for November 1930 Lieut.-Col. J. A. Sinton, I.M.S., gave a most valuable résumé of the results of his nine years' study of different methods of treatment in malaria, but this study dealt chiefly with methods suitable for use in hospitals. We would suggest that it might be of interest to carry out a large scale test on the value of cinchona febrifuge in mass treatment of labour forces, etc. The chief difficulty in India in the treatment of malaria by the cinchona alkaloids is that any methods of purification of the alkaloids adopted necessarily raise the cost of the drug concerned. What India requires on a large scale is an efficient yet very cheap remedy.

In this last connection we are informed that the Director-General, Indian Medical Service, is preparing a scheme for submission to the Government of India with the object of promoting the use of quinine, and we are quite sure that Major-General J. W. D. Megaw, C.I.E., I.M.S., will welcome any suggestions that may be made. It is hoped to put up "treatments," consisting of 20 tablets of 4 grains each, in a container similar to those used by commercial manufacturing chemists, and to advertise the use of these "treatments" by coloured posters, etc. If such a treatment can be sold retail at a price of about 4 annas, it may do much to popularise the use of quinine in India.

There is one point which the critics sometimes forget, and that is that if any attempt was made to sell quinine in India at a price below that of the world market rate, Indian quinine would immediately be bought up by agencies outside India. One Province in India has already had an experience of this. The price of quinine, however, has fallen very appreciably of recent years, and we hope that it will continue to decline.

R. K.

Medical News.

THE 38TH CHEMISTS' EXHIBITION.

THE Chemists' Exhibition, organised by the *British and Colonial Pharmacist,* was established in 1896 in London, and there is nothing approaching it in size and comprehensiveness held anywhere else in the world. It was organised to give the practising pharmacist an opportunity every year of seeing, under one roof, all the goods he sells and the various utensils, apparatus and other requisites he uses in his profession. The management is always delighted to welcome visitors from the Dominions and Colonies, and such gentlemen will be admitted on presentation of their business card. The exhibition has grown continuously and this year will be housed, from 11th to 15th May, in the handsome new Hall of The Royal Horticultural Society, Westminster, S. W., in the very heart of London, practically under the shadow of the Houses of Parliament and Westminster Abbey.

THE SECOND INTERNATIONAL HOSPITAL CONGRESS, VIENNA, JUNE 1931.

WE have been asked to notify our readers that the Second International Hospital Congress will be held at Vienna from the 8th to the 14th June, 1931, in connection with the Vienna Fair. It has also been arranged to hold an International Hospital Exhibition in connection with the same Congress. The official opening of the Congress will take place on 8th June in the Court Palace (Hofburg), and the daily sessions will be held in the Fair Palace. The First International Hospital Congress was held in 1929 at Atlantic City, and was very successful. The organisers of the Second Congress hope that it will help to forward the cause of hospital organisation.

Details can be obtained from the Publicity Department, Vienna International Fair, VII, Messeplatz 1, Vienna.

THE SECOND GARTON PRIZE AND MEDAL.

Particulars of Rules and Regulations to which all candidates must subscribe.

THE Prize and Medal has been instituted by the Grand Council of the British Empire Cancer Campaign with the object of promoting investigations into the Nature, Causes, Prevention and Treatment of Cancer. A Medal (suitably inscribed and engraved with the seal and motto of the Campaign), together with an honorarium of £500, will be awarded to the person, or group of persons who shall submit the essay embodying the results of original investigations which, in the opinion of the Judges, appointed by the Grand Council of the British Empire Cancer Campaign, is the best contribution towards *The biological effects and mode of action of radiations upon malignant and other cells.*

In the event of several dissertations of sufficient merit being submitted, the Prize may be divided, or additional awards made.

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The Prize will be reserved if, in the opinion of the Council, no dissertation of sufficient merit be received.

Candidates, who may be of either sex, must be *British subjects domiciled in the British Empire* and not at the time members of the Grand Council of the British Empire Cancer Campaign.

The honorarium may be awarded either to an individual or to a group of persons who jointly submit a dissertation.

The dissertations shall be printed or typewritten in English, and embody the results of original investigations carried out, either wholly or in part, during the three years immediately preceding the year in which the prize shall be awarded.

The dissertations shall not bear the name of the author or authors, but shall be distinguished by a motto or device, and be accompanied by a sealed envelope containing the name and address of the author, and having on the outside the motto or device corresponding with that on the dissertation.

The dissertations shall be addressed to the Honorary Secretary, British Empire Cancer Campaign, 12, Grosvenor Crescent, Hyde Park Corner, London, S. W. 1, and be delivered not later than 31*st December*, 1933.

The Prize dissertation (with all accompanying illustrations and preparations) shall become the property of the British Empire Cancer Campaign, and shall be published at their discretion under the name of the author or authors.

Dissertations not approved for a Prize shall, upon authenticated application within three years of the award on the specified subject, be returned together with the unopened envelopes containing the names and addresses of the authors.

The award of the Second Garton Prize and Medal will be made early in 1934.

THE ANTI-MALARIAL ADVISORY COMMITTEE OF THE ROSS INSTITUTE.

THE meeting of this Committee on the 16th December, 1930, was especially notable on account of the description given by Dr. G. C. Ramsay, O.B.E., on the malaria problem in Assam. There has been a certain amount of misunderstanding in the past as to the relationship between the Calcutta School of Tropical Medicine and the problem of malaria in the tea estates in Assam and the Duars. The Indian Tea Association has most generously financed a chair in research work at the Calcutta School since 1920, and, when certain tea gardens are known to be very malarious, it is not unnatural that questions should be asked as to why the Calcutta School of Tropical Medicine does not carry out a local investigation and make recommendations. The answer is that it is the duty of the Calcutta School to teach and to carry out basic research work; the application of the results in the field is a matter for the local authorities. Once this principle is clearly grasped, there can be no question of any competition or difference of opinion between the Calcutta School of Tropical Medicine and the Assam Branch of the Ross Institute; the latter's activities under Dr. Ramsay are very clearly complementary to the work at the School, whilst the newly formed Assam Medical Research Society has also a full programme. Given basic research work at a large centre, such as Calcutta, on such problems as the best lines of treatment of malaria, and the limitations of atmospheric temperature and humidity on the transmission of the disease by different species of Anopheles mosquitoes—or on the still but imperfectly known bionomics of Anopheles larvæ and adults—, it is clear that basic research at such a centre plus the application of ascertained results in the field represent the best results obtainable for the expenditure incurred.

The following is an abstract from the minutes of the meeting of the Anti-Malarial Advisory Committee of the Ross Institute.

Assam Branch.—The Assam Branch of the Ross Institute was officially opened on 1st August, 1930, with a backing of Companies and Proprietors owning over 125,000 acres of tea. Since its formation a great deal of ground had been covered, a report of which had been issued. Dr. Ramsay's policy was based on a careful study of the malaria problem from all aspects. He had done valuable scientific work, and followed it up by no less valuable and successful practical work. Sir Malcolm Watson felt sure they would like to hear from Dr. Ramsay himself something of the work he had done and the conclusions he had reached. Sir Malcolm himself as well as many other independent medical men, including some members of the Commission sent to India by the League of Nations, had checked Ramsay's work and confirmed his results and statements. So he felt they were on sure ground and could push on with the work throughout Assam and Bengal.

Dr. G. C. Ramsay said it was a great pleasure for him to attend this meeting and to give a brief account of his work on malaria in Assam. He first went to Assam in 1914 as assistant to a general practitioner. In those early days he learned a great deal about many things, but nothing about the control of malaria. No one believed control possible. He left Assam in 1914 to join His Majesty's Forces and returned in 1919. He then began research work. Even then malaria control was looked upon as an impossible proposition. Hookworm was regarded as the chief cause of anæmia and inefficiency. He began on that disease and how it was propagated. At that time pigs were regarded as valuable scavengers, and were encouraged. He found, however, that pigs eat human excrement containing ankylostome eggs, that the eggs passed through the pig without being digested, and that the pig actually broadcast the ankylostomes more than the coolies. He dissected over 40 pigs and found living eggs from the one end of the alimentary tract to the other. The objection was raised that the eggs would not hatch after being subjected to the high temperature of the pig, which is normally about 101-102°F. But he proved the eggs were alive by hatching them, and eggs, obtained from human pneumonia patients whose temperatures were from 103–104°F., were also hatched out. His conclusions were fully confirmed by Dr. Chandler, of the Calcutta School of Tropical Medicine, who visited him specially to see his work.

He next showed that there was no relation between hookworm and the amount of sickness on his gardens. He took 300 coolies from three healthy gardens, and 300 from three unhealthy gardens, practically 100 per cent. of both groups were infected; so hookworm was a common factor. The difference between the two groups was that on the three healthy gardens, the spleen rate was low, whereas on the three unhealthy gardens, the spleen rate was high.

He then decided to inquire if the high spleen rate was due to kala-azar, another disease with enlarged spleen. So he examined 500 coolies by spleen puncture. In only two did he find kala-azar, and they were coolies who had come from known kala-azar districts in Assam.

These investigations proved beyond the possibility of dispute that the chief cause of all this sickness, inefficiency and death was malaria. And if they could wipe out that disease, they would empty their hospitals, raise the efficiency of their labour forces, increase the number of working days, and empty their orphanages. The contrast between the malarial and non-malarial gardens was extraordinary, and showed the enormous gain to the Estates that the elimination of malaria would bring. But how was that to be done?

The general attitude of medical men in India was that malaria control through mosquito control was a pure dream that could never be realised. The only practical policy was to improve the health of their coolies, and enable them to fight the disease. So hospitals were provided and extended, the sick were given a good diet when in hospital, and when discharged joined special musters where they still got food; children and pregnant women were fed daily, as were coolies who were anæmic but wished to work and be treated as outdoor patients. Orphanages were built

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for the many children who lost their parents, and everything anyone could suggest was done. But the result, as far as stamping out malaria, was nil. "Bonification," as it is called, was a deep disappointment.

But after reading Sir Malcolm Watson's book on Rural Sanitation, and learning what could be done by studying exactly what species of anopheles carried the disease and striking at that species only, he decided to investigate malaria by these methods. Sir Malcolm had stressed the importance of work in the field, and a study of different types of land, to supplement laboratory work; and that he also concentrated on. There were 20 different species of anopheles in his district, breeding everywhere. His task was to discover which species carried malaria. He made some 50,000 dissections of anopheles, which he believes constitutes a world record, and found that practically only *Anopheles minimus* was infected.

His next researches were on climatic conditions, changes in the soil, etc., which meant a considerable time in the field. He found the malaria-carrying mosquitoes in some places and not in others, and that they breed under some conditions and not others. Generally speaking, they required clear, slowly running water exposed to sunshine.

Dr. Ramsay went on to describe the use and application of larvicides, oiling and Paris green, and gave instances where oil and Paris green had been used with immediate results. Biological methods were also used with success. Photographs were passed round illustrating dangerous breeding places, and other places, which to the uninitiated looked even more dangerous, but were really healthy. Other photos showed the growth of certain plants, some suitable for planting on dry land and some for planting in swamps, selected to produce heavy shade, which was inimical to *A. minimus*. The good results were verified by the League of Nations Commission in Assam and many others. The efficiency of the labour force was doubled, there was a reduction of cases of sickness, and the amount of drugs used has dropped by half.

Sir Malcolm Watson said they had just listened to an account of a very thorough series of researches into the cause of sickness on tea gardens. It was really very brilliant work. He himself had made a close study of the malaria problem in Assam since he had first visited it in 1924. His own independent observations and conclusions were in complete accord with those of Dr. Ramsay. He congratulated Dr. Ramsay on his work, and congratulated the Ross Institute on having Dr. Ramsay on its staff. But, above all, he felt the tea industry could see for themselves that they were building on a sure foundation. There were a great many methods of controlling malaria, and at present Dr. Ramsay was developing the effect of silting undrainable swamps, and encouraging the growth of certain swamp plants and destroying others. The Ross Institute intended to publish notes on this subject, illustrated by photographs prepared by Dr. Ramsay and Dr. Fraser.

Meanwhile, the Assam Branch of the Ross Institute was receiving strong support from the Tea Industry, which was greatly indebted to Lord Inchcape for releasing Dr. Ramsay. Dr. Ramsay returned to Assam early in January.

Rhodesia.—Sir Malcolm Watson stated that Mr. Nicolaus (who was present at the meeting, representing the Rhodesian Selection Trust) and Mr. Storke visited the Ross Institute last year and asked whether help could be given with the health problems and the sanitation of their mines. The result was that an Expedition was organised by the Institute, and Sir William Simpson, Dr. Dalzell and Mr. Harrison went to Northern Rhodesia. Last March, Sir Malcolm Watson himself went out to check the scientific work and inspect the practical work accomplished or in progress. He was well satisfied with the work done, and was confident that they had got malaria well under control. He was convinced from what he saw that the control of malaria would make the high tablelands of Africa a White Man's Country, and that that day was not so far distant.

South Africa.—The Union Government asked Sir Malcolm Watson if he would extend his researches into South Africa, and he accepted their invitation and spent a month there. He had outlined a policy which he suggested the Union Government should adopt to combat malaria. The matter was very serious in some places, like the Low Veldt, where land development was being held up. He had advised the Government to adopt the malaria policy of Malaya; that it was the duty of Government to assist in scientific research on malaria, and to undertake malaria control on Government land; but that the duty of controlling malaria on private land rested on the private owner. He was satisfied that this would give the desired result most speedily and most economically.

There were large areas of sugar in Natal and Zululand. He had travelled some 500 miles there with Dr. Park Ross, Dr. Annecke and Mr. De Meillon who gave him valuable assistance. He found that in Natal and Zululand some swamps were free from malaria and some not. Malaria was severe at times on sugar estates, and caused heavy loss both directly in loss of labour, and even more by preventing proper weeding and cultivation which stunted the growth of the young canes, so that the crop per acre might be reduced some 50 per cent. or more.

The first thing to be done was to determine the actual species of anopheles that was carrying malaria, as he himself had done in Malaya and Dr. Ramsay had done in Assam. This would lead to economy in control. Professor Swellengrebel had gone to Africa lately and was, he understood, working on these lines at the present time.

Italy.—Major Lockwood Stevens stated that in July last the Second International Malaria Conference was held in Algiers, and explained that it was the policy of the Ross Institute not only to have printed reports, but to have a representative who could supplement these by personal contact and discussions with the members of the Congress. Mr. R. Senior-White, F.R.S.E., F.E.S., from India, was asked to represent the Ross Institute at this Malaria Conference, which he kindly did. He has submitted a very valuable report.

Mr. Senior-White, accompanied by Dr. Hackett, then travelled throughout Italy and Sardinia. He has submitted a valuable report on the excellent work being done by the Italians and the Rockefeller Foundation.

Sir Malcolm Watson stated that Italy was beginning to follow Malaya in malaria control. An enormous number of lives had been saved in Italy by quinine, but it was being proved that better results were obtained by mosquito control than by the use of quinine. He mentioned the malaria problem of the Balkans during the War. He understood it was not really as difficult as had been represented, and said it was a great pity that more was not known about it a few years ago, as the tragedy of Salonica might have been prevented.

Hongkong.—It was reported that in Hongkong a full investigation into the malaria problem, and the mosquitoes that carried the disease, was being made under the direction of Dr. A. R. Wellington, now Principal Civil Medical Officer, who had done valuable scientific and practical work when in Malaya. In Hongkong there were several species of anopheles. In some places there was malaria, and in some very little even where *Anopheles maculatus*, the notorious carrier in Malaya, existed in large numbers. Much scientific work was still required on why some anopheles carried malaria and others did not, and why a species carries in one country and not in another. What we knew so far was that, generally speaking, all the carriers lived in clean water, and that those that lived in less clean water containing the products of vegetable decomposition did not carry. It may be that it was due to some effect on the larva which was continued in the adult. It may be due to preferences of certain species for animals instead of for human beings. We were not certain. But clearly there was need for further investigation

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which might lead to important developments in the practical control of malaria.

Mr. Nicolaus, of the Selection Trust, speaking of the Rhodesian Copper Mines, stated that since the Ross Institute Expedition to Northern Rhodesia, the incidence of malaria on one mine had dropped from 27 per cent. per month to eight cases of malaria per month in a total population of between 8,000 and 10,000 at the end of October 1930. Since mosquito control had been inaugurated on another mine where there is a population of between 10,000 and 11,000 souls, the malaria incidence for October 1930 was five Europeans and four natives (new cases). This shows what has been achieved by adhering to the policy of Sir Malcolm Watson and the Ross Institute.

Current Topics.

The Bulletin of Hygiene.

THE *Bulletin of Hygiene*, published by the Bureau of Hygiene and Tropical Diseases, Keppel Street, Gower Street, London, W. C. 1, commenced its sixth year of publication in January 1931. It is published monthly, and the subscription rate is only 21*s*. post free. With the commencement of the sixth volume, a new method of classification of subjects has been adopted. The reviews are divided under the following classification of subjects: public health administration and social services, industrial hygiene, hygiene and diseases and accidents of special industries and occupations, vital statistics and epidemiology, port and ship hygiene, sanitation—including housing, food and nutrition, bacteriology and immunity, sanitary law, a miscellaneous section, and book reviews. Such an enumeration shows the extremely wide ground which the *Bulletin* covers. Reviews are all signed, and a perusal of the pages shows that the reviews are all authoritative. The January 1931 number, for instance, has an admirable essay-review by Dr. S. Roodhouse Gloyne on the subject of B. C. G. vaccine in tuberculosis.

The Bureau of Hygiene and Tropical Diseases is supported partly by official grants from the British, Colonial, and Indian governments, and publishes not only the *Bulletin of Hygiene* but also the invaluable monthly *Tropical Diseases Bulletin*. It is, however, very much dependent upon subscriptions to both journals. We cannot imagine how any medical practitioner in the tropics can keep up to date without a study of the *Tropical Diseases Bulletin*, or any public health worker in the tropics without his monthly copy of the *Bulletin of Hygiene*. Both journals are admirable, in that they provide the medical man with a brief summary review month by month of all important advances in tropical medicine and hygiene, whilst any research worker by consulting them can easily and quickly find the titles and references to the original literature on any subject. Personally, we take in both journals not merely as exchange copies, but as subscribers, and we would urge medical men in India to do the same. They will have no cause to regret such a subscription, for they will receive full value for it. Unless the Bureau receives from medical men in the tropics the support which it so thoroughly deserves, its financial position will remain unsatisfactory.

Studies of the Etiology of the Common Cold.

By G. S. SHIBLEY, M.D.,
K. C. MILLS,
and
A. R. DOCHEZ, M.D.

(Abstracted from *The Journal of American Medical Association*, Vol. 95, No. 21, 22nd November, 1930, p. 1553.)

IN recent years widespread recognition has come about of the fact that the common cold is not a simple minor infection of the upper respiratory tract which, because of its mild symptomatology, can be conveniently disregarded. The more thorough study of this disease begins to indicate that perhaps it may be the keystone of that complex structure of ills the etiologic agents of which gain entrance to the body by way of the upper respiratory tract. A complete understanding of the pathogenesis of the common cold would not only be of value in solving the nature of this malady itself but would undoubtedly throw important light on the mechanism of all respiratory infection and even perhaps on certain diseases that are not regarded as clearly respiratory in origin.

Information concerning the etiology of the common cold is obviously the *sine qua non* of the understanding of this infection and of its causal relationship to other disease. Many organisms have at different times been assigned an etiologic rôle and frequently the evidence in favour of one or another agent has been impressive. Many of the organisms described have been comparatively well known and in many instances easy to study bacteriologically. To all students of upper respiratory infections the importance of such organisms has been clear, yet not one of them has maintained its position as the principal initiating agent, but all have sooner or later been assigned a secondary rôle. What, then, is the complex sequence of events in which so many micro-organisms seem to participate?

For a number of years we have been studying the problem of the etiology of the common cold. We have sought from the beginning to attain our goal by a process of elimination, realising, from the beginning, that the final word about the significance of any organism could not be said, at any stage of the investigation, but following the evidence where it seemed to lead in the hope that, in the end, the mechanism of the infection would become clear.

Our first efforts were directed toward displacing the common potential pathogens of the upper respiratory tract such as pneumococci, streptococci, Pfeiffer's bacillus, staphylococci, the Gram-negative cocci, and the Gram-negative filter-passing bacteria, described first by Olitsky and Gates, from the position of primary importance. In pursuit of this objective a number of normal individuals were studied, and by making serial cultures over periods of several months the basic bacterial flora of their noses and throats was determined. Concurrently detailed observations were made of quantitative and qualitative changes occurring in this flora during the course of colds. From the results of this study we were led to conclude that none of the aerobic organisms are of primary etiologic significance because none appear for the first time or in significantly increased numbers during the early days of the cold. Later they may be present as important secondary invaders. This agrees with the earlier observations of Bloomfield. Furthermore, for essentially the same reasons we came to the conclusion that the filter-passing anaerobes constitute part of the normal flora of the upper respiratory tract and do not have a causative relationship to the common cold.

Following these observations an effort was made to test the hypothesis that colds are caused by a filtrable virus, one of those mysterious agents the exact nature of whose biologic activity still remains obscure. Important evidence in favour of this view had already been brought forward by a number of investigators. We decided to use animals for the experiment and in searching about for a suitable animal we discovered that anthropoid apes are supposed to catch colds. We soon found, by inquiring of workers with these animals, that the higher apes readily contract colds from human beings and furthermore that these colds are similar clinically to those observed in man.

A colony of young chimpanzees was assembled and placed under observation. To guard against accidental infection they were kept in specially organised rooms under rigid quarantine whenever experimental procedures were in progress. The animals in the stock room could not be so rigorously protected from contact infection because of insufficient facilities. Very early

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in our work we learned the truth of the report that anthropoids are susceptible to the human type of upper respiratory infection. When the men handling the animals have had colds, the apes in the stock room have frequently contracted the infection even though the men have always worn gauze masks. Colds of this type spread rapidly from ape to ape and the clinical picture is similar to that observed in human beings. At first there is a small amount of glairy mucus in the nostrils. By the end of the first day the animal usually appears quite sick. Lassitude is fairly striking, the eyes are puffy and drooping, a moderate to profuse nasal discharge of thin mucus runs down over the upper lip, there is definite nasal obstruction which makes it difficult for the animal to take liquid food, and breathing becomes audible. There is occasional sneezing and coughing, the appetite is impaired, and rarely there has been diarrhœa. Usually there is no elevation of the temperature. By the second or third day the nasal discharge becomes mucopurulent and the throat at times shows evidence of inflammation. Recovery is usually complete in from a week to ten days. Occasionally bronchitis is a sequel and there has also been a persistence of purulent nasal discharge indicating a paranasal sinusitis.

A continuous study of the bacterial flora of the upper respiratory tract in the chimpanzee has been undertaken. The bacteria of the throat have been discovered to be surprisingly similar in man and in the ape. The usual basic organisms such as non-hæmolytic streptococci and Gram-negative cocci are identical in incidence. *B. pfeifferi* and *S. hæmolyticus* are more frequently present in the ape than in man. As in man pneumococci are only rarely obtained when blood plates are used as culture mediums. In cultures from the nose the staphylococcus is usually the predominating organism in man and is the same in incidence and numbers in the ape. Diphtheroids that are frequent in the nasal flora of man are lower in percentage incidence in the chimpanzee. Gram-negative filter-passing anaerobes also have been cultivated from nasal washings obtained from apes, but the exact incidence of these organisms has not been determined.

From the foregoing facts we may conclude that chimpanzees are susceptible to the human type of upper respiratory infection; that the clinical manifestations noted when these animals catch colds closely resemble those seen in man under similar conditions, and that the bacterial flora of the nose and throat of chimpanzees is practically identical with that of man.

We are therefore assured of the suitability of chimpanzees for the experimental transmission of the common cold from man to animals. The apes in each experiment were placed in strict quarantine, and a rigorous surgical technic was employed by the workers who came in contact with them. Food, utensils and cages were sterilized as far as this was possible. The animals were kept in quarantine for five or more days before being used to test the efficiency of the isolation and to exclude the possibility of latent respiratory infection. No animal under this type of isolation has contracted other than an experimental cold during the period of study.

At the conclusion of the period of preliminary observation, individuals suffering from suitable types of colds were sought out. Nasal washings from the subjects with colds were obtained by running slightly warmed buffered meat infusion broth into their nostrils and thence out through the mouth. From 10 to 12 c.c. of broth was gargled and added to the nasal washing. The material was then passed rapidly through a Berkefeld V filter. The unfiltered washing was cultured aerobically and the filtrate anaerobically on blood plates, blood broth and Smith-Noguchi medium. As a further control, 0.25 c.c. of filtrate was injected intracerebrally or intracisternally in rabbits in order to exclude the presence of herpes virus. As soon as possible after filtration of the nasal washing, 1 c.c. of filtrate was injected with careful aseptic precautions into each nostril of the quarantined chimpanzees. For each experiment it was customary to collect two nasal washings at intervals of a few hours and to make two separate intranasal inoculations in each experimental animal.

In all, twenty-eight inoculations of chimpanzees have been made with filtered nasal washings from human beings. Of these, twenty were obtained from patients in the acute stage of the common cold and eight from normal individuals at a season of the year when colds were at their lowest incidence. Of the twenty experiments with filtrates from colds, four have been excluded since the inoculations were made in animals recently purchased which had recently suffered from respiratory infection. Of the remaining sixteen animals, seven contracted experimental colds, an incidence of 44 per cent. of successful transmission. The symptomatology of the experimental cold resembled exactly that of the spontaneous cold previously described. The usual incubation period was from thirty-six to forty-eight hours. The onset was characterised by lassitude, loss of appetite and the presence of a mucus nasal discharge. This was quickly followed by nasal obstruction, sneezing, coughing, and sometimes by inflammation of the pharyngeal mucosa. The mucous discharge eventually became mucopurulent and symptoms at times lasted as long as three weeks.

Perhaps the most significant change observed has been the increase of activity on the part of the potential pathogens habitually present in the throat flora. Coincident with the appearance of symptoms, pneumococci, *Streptococcus hæmolyticus* and *B. pfeifferi* have developed in greatly increased numbers and have spread over a wide area of the nasopharyngeal mucous membranes. These organisms become at this time conspicuous even in the nose, where they are seldom or never present under normal conditions. The same phenomenon has been observed in the spontaneous colds of apes but has not been observed in human beings.

Control experiments of two types have been performed. Chimpanzees have been inoculated with heated filtrates from colds and in no instance has an experimental cold developed. A somewhat better control has been the inoculation of the animals with filtered nasal washings from normal human beings, obtained at a time when colds were not prevalent. Following the latter inoculations, no symptoms whatever have been observed and no qualitative or quantitative change in the potentially pathogenic nasopharyngeal flora could be determined.

Filtered nasal washings from human beings suffering from colds and from normal individuals have contained Gram-negative filter-passing anaerobes in nearly the same proportion of instances. No evidence, however, has been obtained that these organisms have any etiologic significance in the initiation of a cold. A number of positive results have been obtained with filtrates in which these bacteria were absent. Many times experiments have been negative with filtrates from colds which contained large numbers of these anaerobes. Furthermore, inoculation of fresh cultures of these organisms from subjects with colds has always failed to produce respiratory symptoms in the ape. Organisms of this type have been present in the filtered nasal washings of 75 per cent. of normal individuals; following the inoculation of this material into apes, no symptoms have resulted.

During the course of this animal experimentation we have observed that the duration of immunity from colds has been from three to four months. During the epidemic of influenza in the early winter of 1929, the chimpanzees in the stock room contracted, from one of the keepers, a type of respiratory infection characterised by pronounced constitutional and respiratory symptoms, which was quite unlike the common cold. This occurred well within the immune period and suggests that this influenzal infection is caused by an etiologic agent different from that of the common cold. Exposure of sound animals to apes suffering from an experimental cold has resulted in a contact cold of similar nature in the exposed animal. On two occasions, experimental colds have been successfully transmitted from chimpanzee to chimpanzee.

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As a consequence of the foregoing observations we have considered it advisable to attempt the experimental transmission of the common cold from man to man. For this purpose human volunteers, preferably young adults, were secured. They were placed under rigorous isolation of the type described and under the control of a nurse experienced in the application of surgical aseptic technic. A fore-period of five or more days was instituted and all articles entering the room, including food, whenever possible were sterilised. On entering quarantine the subjects were given a thorough physical examination. A study of the throat flora by daily culture and a mouse inoculation was undertaken. All physically unsuitable individuals and all who harboured possibly dangerous pathogens in their upper respiratory tracts were excluded from this type of experiment.

At the termination of the period of observation and study the selected volunteer was inoculated intranasally in the manner previously described with filtered nasal washings obtained from individuals suffering from the early stages of the common cold. In a number of instances plain sterile broth was injected intranasally to exclude and control any symptoms that might arise from the irritating effect of the broth itself. Irritation arising from this source was found to be negligible. Nine experiments of this type have been completed and in four instances colds have been successfully transmitted, a 44 per cent. incidence of positive experiments, which is the same as that obtained in the study with anthropoid apes. Objective signs of upper respiratory infections were considered indispensable for the interpretation of a result as positive. These consisted in injection of the conjunctivæ, profuse nasal discharge, mucopurulent postnasal discharge, frank inflammation of the nasopharynx with swelling of the lymph follicles and continuous cough. The common symptoms were stuffiness of the nose, sneezing, sore throat and headache. No fever was observed during the course of the attacks. The duration of the colds was approximately one week. Two of the subjects experienced exacerbation of their colds on being discharged from quarantine, and this was interpreted as signifying the acquisition of secondary infection due to exposure to contacts on release from quarantine. Manifest secondary infection obviously could not take place during the period of isolation and, furthermore, all individuals harbouring dangerous pathogens were excluded from the tests, so that one would expect this symptomatology to be less severe than in an individual having many daily contacts and therefore being frequently exposed to secondary infection. Filter-passing anaerobes were present in all the filtered nasal washings used in the studies of human transmission, both the positive and the negative results. The varieties of anaerobes present were the same in the two instances. For the reasons previously stated, these organisms are not believed to possess primary etiologic significance.

CONCLUSIONS.

The foregoing experiments lead us to certain definite conclusions. The contagious cold in human beings is caused by an invisible uncultivable, filtrable agent which in all likelihood belongs to the group of so-called submicroscopic viruses. Colds can be transmitted successfully from man to the chimpanzee and from man to man by means of Berkefeld filtrates of nasal washings obtained from individuals suffering from spontaneous colds, more specially during the period of rising incidence of infection in the community. These experimental colds resemble in all respects colds spontaneously contracted in the natural environment. In apes, one of the significant effects of infection with the filtrable agent is the stimulation into greatly increased activity of any potential pathogen that may happen to be present in the upper respiratory flora. This we regard as of great importance since it seems to explain the marked secondary activity in the respiratory tract of such organisms as pneumococci, *Streptococcus hæmolyticus* and Pfeiffer's bacillus, which lead to the severe sequelæ which sometimes follow the common cold and influenza. In fact, the most important significance of viruses of this type seems to lie in their capacity to incite activity on the part of the more dangerous pathogenic organisms that infest the upper respiratory tract.

Simple Local Anæsthesia in the Reduction of Fractures.

By DAVID LEVI, M.S., F.R.C.S.

(Abstracted from *The Practitioner*, December 1930, Vol. CXXV, No. 6, p. 738.)

THE advent of the motor-car as the possession of the masses of the population has rendered the general practitioner in town or country liable to be faced with a fracture at any time of the day or night. Very often he is called upon to deal single-handed with a broken limb. It is on this account that the method of reducing fracture under local anæsthesia as practised by Bohler in Vienna was forcibly impressed on my mind when I paid a visit to his fracture hospital. The method as originated by him is simple, safe and very efficient, and, in his hands, gives excellent results. The apparatus required consists of:—(1) A quantity of 2 per cent. novocaine; ampoules of 20 c.cm. (2) Two 10 c.cm. syringes. (3) Two or three hollow needles of varying lengths. (4) Two pairs of sterile forceps. (5) Sterile swabs and iodine.

These requisites are generally to be found in the surgery of every practitioner, and by their use in the manner to be described the services of an anæsthetist and an assistant can be entirely dispensed with. Another advantage attached to the use of this method is that the fracture is reduced when it is first seen. The reduction takes place within a short time of the receipt of the causative injury, before œdema and the diffusion of the inevitable hæmatoma render the palpation of the bone ends difficult and their consequent exact reposition impossible.

The patient should be placed on a couch in the recumbent position; this is an important precaution, for a person who has recently broken a limb and who has had the site of fracture anæsthetized is very apt to forget his injury. There is a story of a man who fractured his tibia and had the site of fracture rendered painless by an injection of novocaine; he stood on his injured limb in order to talk to the policeman who had taken him to the hospital. The result as far as the broken leg was concerned was disastrous.

The technique is very simple. The site of maximum tenderness on the surface of the limb, which, as is well known, corresponds with the site of the fracture of the bone, should be noted, and the skin painted with iodine. One of the hollow needles should then be grasped with the sterile tissue forceps, and inserted over the tender spot. It should then be pushed in until the point of the needle touches the bone. A sterile 10 c.cm. syringe, which has previously been filled with 2 per cent. novocaine, is attached to the end of the needle protruding from the limb. Five c.cm. of novocaine solution should be injected and the syringe detached. The escape of blood-stained fluid from the needle signifies that its point is in the hæmatoma, and 20 c.cm. of novocaine should be injected immediately through the needle, which has remained *in situ*. If blood-stained fluid does not appear, then the needle should be withdrawn and re-inserted. The amount of novocaine to be injected depends on the size of the bones fractured. Twenty c.cm. is the average amount required. The object of the above procedure is to inject novocaine into the hæmatoma, which is always present to a greater or lesser degree round the ends of a fractured bone. Novocaine, once in the hæmatoma, rapidly diffuses through its whole substance, and anæsthetizes the bone ends and the adjacent muscles.

Under this local anæsthetic most simple fractures can be reduced with the greatest of ease, and splints can be applied with very little inconvenience to a

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patient. In impacted fractures, the procedure is not quite so simple, as the hæmatoma tends to be loculated. This loculation is caused by the bone ends which have been jammed against each other. This is notably the case in Colles's fracture, when the lower fragment is crushed into the shaft of the radius. In such instances, the hæmatoma is usually bi-locular, and novocaine should be injected on the flexor as well as on the extensor surface of the bone before disimpaction—which is so essential for good alignment of the fragments—becomes painless.

If the styloid process of the ulna is fractured as well, novocaine must be injected into the hæmatoma round it. The hæmatoma round the radius does not communicate with that round the ulnar styloid. Unless this precaution is taken, pain will be experienced during the course of the manipulation necessary for the reduction of such Colles's fractures. If this type of fracture is the first one in which this method of anæsthesia is attempted, the method will be somewhat unjustly condemned unless the three injections described above are made before any attempt at reduction is resorted to.

Common Maladies and Their Treatment.

INJURIES TO THE EYE.

By PHILIP A. HARRY, M.D., D.P.H.

(Abstracted from *The Prescriber*, January 1931, Vol. XXV, No. 1, p. 31.)

ACCIDENTS to the eye should always be treated as serious surgical emergencies, and dealt with by an expert under the best conditions possible. The injuries should receive careful consideration and immediate attention for the reason that there is always danger of blindness in both eyes as a result of injury to one.

For purposes of classification, eye accidents may be divided into two groups—extraocular and intraocular, the latter including perforating and penetrating wounds. Investigation of the case will consist of examination by the ophthalmoscope, *x*-rays, the magnet, and the slit lamp. In the case of a child a general anæsthetic is necessary for efficient diagnosis. It is important to obtain an exact history of the accident, as in this way much may be learned regarding the nature of the injury and its possible complications. The skin and the structures round the eye should be inspected and then palpated, the tension of the eye being gently estimated before making any attempt to open or evert the lids. This will show whether there has been a perforation of the eyeball. All rough and awkward manipulations must be avoided. Examination of the globe itself should commence with thorough exploration of the conjunctival sac in good light before and after irrigation with normal saline or boric lotion. A 2 per cent. solution of fluorescein in an alkaline medium is useful for demonstrating corneal abrasions and conjunctival loss of substance. In the case of a farm hand, into whose upper fornix a piece of straw half-an-inch long had penetrated, the instillation of this stain was instrumental in making a diagnosis leading to the recovery of the foreign body. In extraocular injuries, after completing the necessary examination, a 20 per cent. solution of argyrol should be dropped into the conjunctival sac. This substance is used, not for its antiseptic properties alone, but also because its solution is so heavy that it finds its way into every part of the sac as well as the nasal duct.

An injury frequently met with is the well-known "black eye"; this is due to contusion of the lids or the contents or wall of the orbit. On account of the structure of lid there is early and marked œdema, associated with ecchymosis and a feeling of tension. The discoloration of the lids is at first purple and later becomes yellowish-green. Cold compresses firmly applied will prove an effective form of treatment.

Marked swelling of the lids may also be produced by entrance of air into the palpebral connective tissue. This emphysema is a sign of fracture of the orbital wall. The lids are uniformly swollen and immovable and the skin tense and shiny. There is little or no tenderness, and the lid does not pit on pressure although crepitation may be elicited. The patient must be advised to wear a pad and bandage and not to blow his nose.

Burns and other injuries of the conjunctiva are followed by injection and infiltration, rupture of the vessels, and subconjunctival ecchymosis. Foreign bodies in the conjunctival fornices can easily be detected and removed on careful eversion of the lids; a suitable spud will remove similar particles from the cornea and removal should be carried out promptly to avoid infection. Lime burns of the cornea and conjunctival sac are among the more serious accidents. All particles of lime must be carefully removed and the eye washed with sweetened water. A 2 per cent. solution of ammonium chloride or neutral ammonium tartrate is useful for irrigating the eye, and the pain is greatly relieved by a 2 per cent. ethylmorphine ointment. Every particle of lime or plaster must be removed from the conjunctival sac. The inner surface of the lids should be carefully dried to prevent the tears from coming in contact with the caustic which is removed by a cotton-wool mop moistened with a strong solution of sugar. Acid burns should be irrigated promptly with a cold solution of sodium bicarbonate, and alkali burns with weak vinegar.

Traumatic abrasions of the cornea caused by foreign bodies, such as leaves, twigs, hat-pins, finger-nails, etc., occasionally produce an exfoliation of the superficial epithelial layer. The wound is exquisitely painful, as the sensory nerve endings are exposed when the epithelial cells are stripped off. The treatment consists of curetting the surface and applying heat to the injured area by means of the galvano-cautery. In some cases it may be necessary to paralyse the lids with ethocaine (novocaine) and morphine to abolish the intense photophobia. Deep corneal wounds, on the other hand, are not often associated with blepharospasm. In cases of congenital syphilis, corneal wounds may incite a true interstitial keratitis.

Fracture of the orbit is an increasingly common accident and may be associated with serious eye injuries. Blows or falls on the outer side of the orbit may injure the optic nerve and produce atrophy. In one case, a youth, aged 18, who was thrown from his bicycle as the result of a collision with a motor car, developed inward squint, proptosis, and arterio-venous aneurysm as a result of orbital fracture. In another case, a woman aged 50, the removal of nasal polypi and curetting of the posterior ethmoid produced optic atrophy and external squint. Blows on the anterior part of the eyeball will cause various injuries that are really intraocular, from a simple contusion with hyperæmia to rupture of the eyeball and subconjunctival dislocation of the lens. Other conditions that directly result from contusions include cataract, glaucoma, traumatic myopia, rupture of the choroid, retinal detachment, paralysis of the muscle of accommodation, hyphæmia with blood-staining of the cornea, commotio retinæ, etc.: treatment consists of the application of cold compresses in the early stages and prolonged rest of the eyes with pad and bandage or the wearing of tinted lenses.

Injuries of the eyeball by a weapon or foreign body may cause a perforation of the globe, or the foreign body may penetrate and be retained in the eye. Two serious dangers common to both types of injury are infection and sympathetic ophthalmia. Penetrating wounds of the sclera are more likely to be followed by primary infection than are similar corneal injuries, owing to the fact that the latter tissue is very tough and elastic, and that the wound of entrance is always smaller than the foreign body, which is mechanically cleaned as it enters. Infective material is also removed by the flow of aqueous from the anterior chamber, and for this reason prolapsed portions of iris should be excised. Wounds involving the ciliary region should be promptly and efficiently treated in order to avoid sympathetic disease. Treatment consists in

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covering the wound with a flap of conjunctiva and applying a suitable antiseptic in the form of lotion or drops; it can certainly be affirmed that fewer cases of this complication have been noticed since the use of acriflavine.

Small perforating wounds produced by a puncture of the eyeball are usually associated with lens injuries. Atropine drops should be instilled to keep the iris away from the lens as much as possible; when the lens swells rapidly, early removal should be carried out. If the ripening is slow it may be necessary to incise the lens capsule freely to encourage fresh solution and absorption. In patients over 50 with a large nucleus, the best treatment is to make a fresh incision and extract the lens. Where a particle of steel has entered the eye, *x*-ray examination will confirm the presence and position of the foreign body, which should be speedily removed by a magnet. Should the particle be non-magnetizable, such as stone or brass, the wound of entrance should be enlarged and the body removed with a suitable forceps, care being taken to avoid loss of vitreous and lowered intraocular tension.

An injured eye should show signs of clearing up in about a month after the accident; if at the end of this time the eye is still red and painful, and the tension diminished, the patient should be advised to part with it. When such an eye is irritable and sensitive to touch, the vision is practically lost, and if the wound is situated in the position of the ciliary region, it becomes a danger to the other eye; it is unnecessary to wait for evidences of inflammation and injection in the uninjured eye. When sympathetic inflammation has already appeared, if there is any sight in the originally injured eye it should not be removed, because the inflammation in the second eye may be more completely destructive of vision than the injury. Treatment is frequently unsatisfactory and consists in hot fomentations and the instillation of atropine drops. Mercury, sodium salicylate, and arsenobenzene have proved useful. Operative treatment should be delayed for several months, owing to the frequency with which the iridectomy opening becomes closed with fresh exudate. During the interval the eye must be kept completely at rest and dark glasses ordered for wear during the day. An inunction of colloidal bismuth cream should be used throughout the period. After a sufficient lapse of time, and if there has been no recurrence of inflammation, operation may be considered. The iris should be interfered with as little as possible, and the lens must be got rid of by needling or extraction. It is important to remember that in these cases the vitreous is liquid and escapes very readily, all incisions must therefore be as small as possible and made wholly in the cornea. Post-operative treatment consists of drops of acriflavine, in aqueous solution or as an emulsion in liquid paraffin, combined if necessary with a 0.5 per cent. solution of hyoscyamine or duboisine. Subconjunctival injections of normal saline solution, mercuric chloride, or mercury salicylate are helpful where complications are feared.

Wounds of the eyelids associated with intraocular injuries should be treated with mercurochrome; and before any operation, plastic or otherwise, on the skin in the neighbourhood of the eye this substance should be used to sterilize the surface. It penetrates further than iodine and stains the deeper layers of the skin and the hair follicles. A suitable solution consists of mercurochrome 2 gm., distilled water 35 c.c., alcohol (95 per cent.) 55 c.c., acetone 10 c.c. In this form mercurochrome can be depended on as a valuable local antiseptic in cases of an injury to the lids even in children. It should be applied at the time of the first inspection, before making any attempt to examine the eyeball. In the majority of cases infection of the eye after perforating injuries is due to insufficient antisepsis of the surface around. The entrance of virulent germs into the interior of the eye leads to inflammation of the uveal tract, developing later into panophthalmitis. Evisceration is advised in this condition, in preference to enucleation, in order to avoid infection of the orbital cellular tissues and meningitis.

In penetrating wounds of the eyeball the foreign body may pass through the globe and remain in the orbit, producing exophthalmos and chemosis of the conjunctiva. A similar condition has been seen in several cases secondary to wounds of the lids and face associated with cavernous sinus thrombosis. The chief symptoms are injection of the eye, with fixation of all the muscles, so that there is no movement of the globe. There is also a considerable degree of chemosis and a thin blood-stained discharge from the conjunctiva. The cornea is apt to suffer from exposure and may ulcerate; this can be effectively treated by the frequent use of drops of castor oil, instilled into the conjunctival sac.

The Principles of Intravenous Urography.

By PROFESSOR DR. ALEXANDER VON LICHTENBERG.

(Abstracted from *The British Journal of Urology*, December 1930, Vol. II, No. 4, p. 341.)

VISUALISATION of the urinary tract is possible in two ways, either through instrumental means (instrumental pyelography or urography) or by employing the function of the kidney to eliminate an opaque substance in the urinary tract (excretion pyelography or urography). In the excretion method the substance employed can be given by mouth, by rectum or through the blood-vessel system, principally by means of intravenous injection.

We are concerned to-day in the evaluation of excretion urography following the intravenous injection of a contrast substance. The idea of intravenous urography is by no means a recent one, but experience with this method has been limited because a satisfactory substance has been in existence only a short time and for this reason final judgment of this new method is not yet possible. It is now possible to open up the vistas of this new territory, and I would like to avail myself of the opportunity to hasten the formulation of these new principles by clinically interpreting the results of over 700 cases. Above all, I would like to formulate the indications and limitations of intravenous urography.

Uro-selectan meets all the demands for clinical success. It is eliminated in the urine in high concentration; it gives good visualisation and is non-toxic in the quantity necessary for intravenous injection.

Concerning the technical details, I wish here only to mention that we use 100 c.c. of a 40 per cent. solution and that we take the first picture a quarter of an hour, the second three-quarters of an hour, and the third picture an hour and a quarter after the intravenous injection. We can also use a 30 per cent. solution or 50 c.c. of a 40 per cent. solution with clinical success.

Intravenous urography with uro-selectan gives us information in three directions:—

(1) We obtain visualisation of the urinary tract, and we learn principally the relationship between the various parts of the urinary tract.

(2) We obtain important information concerning the kidney function by roentgenological means and by qualitative and quantitative chemical findings.

(3) We are able to interpret the dynamics of the urinary tract by observing the expulsion of uro-selectan.

It is important to know what we may expect of this method concerning visualisation of the urinary tract. One may expect a good picture only when the kidney function is satisfactory. The intensity of the picture is dependent for the most part on the functional state of the kidney. Severe double-sided kidney lesions, particularly those showing parenchymal damage, give no picture or a very poor or delayed picture. The intensity of the urographic shadow is absolutely dependent on the kidney threshold of uro-selectan. We have observed in a great number of cases of normal kidney function that the concentration of uro-selectan

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eliminated in urine is about 5 per cent. Such a 5 per cent. solution of uro-selectan cannot give such a strong contrast as the solutions which are used for instrumental pyelography. This means that even in good cases we cannot expect as intense a picture. If there is kidney damage, the intensity of the shadow is even less. In obstruction, however, one often obtains a more intense picture than the concentration of the uro-selectan eliminated would promise.

We also must realise that the contrast filling of the urinary tract is obtained principally when the various portions of the urinary tract are relaxed (in diastole). Those portions of the urinary tract which are in systolic contraction are not filled and so cannot be seen. By means of intravenous urography we are able to reach an accurate interpretation of the dynamic condition of the urinary tract which is constantly changing, due to peristalsis.

There are also important moments which one who is unfamiliar with the method could regard as defects of intravenous urography. These, however, are only apparent defects, as they permit an important insight in the pathology and physiology of the urinary tract.

We can say as a result of our experience that minor disturbances of kidney function cannot be evaluated by intravenous urography. The functional proving by roentgen visualisation is not a precise method. It is satisfactory, however, for clinical interpretation and judgment of surgical lesions. In unilateral conditions it is possible to localise the disease by this method—one can decide which is the diseased side. In double-sided conditions one can often decide which is the more involved side. In relation with the obtained picture this determination is sufficient to allow a clinical diagnosis. Visualisation of the urinary tract allows, through the interpretation of dynamics, the observance of the peristaltic condition (hypertony, hypotony).

The picture of the kidney itself is often more intense than usual, and in many cases is especially intense, due to deposition of the contrast substance in the parenchyma. Good nephrography is not obtainable, however, with the present methods.

The elimination of uro-selectan by the kidney can be followed by the above-mentioned roentgen control; also by control of the elimination of the substance itself in the urine; by estimation of iodine elimination in the urine, and by estimating the specific gravity of the urine after intravenous injections. All of these are to be regarded as elimination tests in the practical sense. The estimation of uro-selectan in the blood may be regarded as a retention test. All of these examinations indicate the total function of the kidneys. I will review briefly some of these examinations.

Uro-selectan contains 42 per cent. organically bound iodine. Forty grams of uro-selectan in 100 c.c. of solution are injected intravenously, which means that approximately 17 grams of iodine are administered. Through the work of Swick and Heckenbach, we know that approximately 90 per cent. of the injected quantity is eliminated by the kidneys, and, of this amount, the greater portion is eliminated in the first two hours after injection. In sufficient kidney function 15 to 16 grams of iodine are eliminated in the urine within ten hours. If this elimination is delayed we have, in a surgical sense, impaired function. In the first two hours the quantity of urine increases, and in the following hours the quantity becomes less, paralleling the curve of the iodine elimination. There appears to be almost pure filtration of uro-selectan from the kidney. Therefore, in internal secretion disturbances and some cases of obstruction which result in increased urinary elimination of low concentration, we obtain good iodine elimination which simulates intact functional activity. Disturbances of the dynamics of the urinary tract which either increase or delay the expulsion are sources of error in estimating kidney function. In double-sided disease and in functional disturbances of the urinary tract, often but 50 to 70 per cent. of the injected iodine can be found in the urine, and undoubtedly in these cases there is a compensatory elimination through the liver and intestines.

By acidification of the urine, uro-selectan is precipitated. The quantitative estimation of uro-selectan in the urine, however, is not satisfactory. The most we can recover from the urine is 70 per cent. of the injected substance.

Through the work of Heckenbach we realise that the quantitative estimation of uro-selectan in the urine is not accurate enough to be applicable as a clinical test of kidney function. The rise and fall of the specific gravity of the urine following the administration of uro-selectan intravenously, however, shows good regularity and gives us similar information as a good concentration and dilution test. In normal kidney function the specific gravity of the urine rises to 1050 and 1060 and then falls to 1030. It is remarkable that the highest specific gravity is usually reached in the third and fourth hours, at a time when the greatest concentration of uro-selectan has passed.

Considering these results, the time of our x-ray pictures seems to be rightly chosen, for the best visualisation would be at the time of the greatest concentration of uro-selectan in the urinary tract.

The hydrogen-ion concentration of the urine falls to the acid side after the administration of uro-selectan. In the third and fourth hours following the injection, the pH usually rises to 5.6 to 5.2 and returns in six hours to approximately 6.8. In very poor kidney function, however, the pH of the urine does not seem to be affected after the injection of uro-selectan. This has been shown by my assistant, Dr. Hughes.

Contrary to what appears in our first publication, the uro-selectan is present in the blood for a long period after injection. Through the work of my assistants, Tourné and Damm, we know that the uro-selectan blood curve falls precipitously in the first two hours, then less precipitously in the following hours. What is especially important, however, is that practically no uro-selectan is found in the blood after four hours. The presence in the blood of a half gram of uro-selectan four hours after injection indicates a minor degree of kidney damage. A higher amount indicates severer damage. The agreement of these results with the usual kidney function tests recommends a four-hour uro-selectan blood estimation as a retention test.

Following the example of Schlayer in examining the distribution and elimination of foreign substances from the body, Tourné and Damm have investigated the distribution of uro-selectan at elimination points and at storing points. The elimination points are principally the kidney and to a lesser degree the liver. The storing point is principally the skin. These results are important in evaluating contra-indications to the administration of uro-selectan, for we can understand that, in severe damage of both kidney and liver, a complication might ensue following injections. We can interpret the fatality reported by Kalk on this ground. All the smaller animals, such as rabbits, died shortly after ligation of both renal arteries following the injection of uro-selectan in amounts which are ordinarily well tolerated. The reaction of these animals seems to indicate that capillary damage is the main causative factor. In these animals there occurs a severe injection of the serous membranes with transudate in which uro-selectan can be found.

Neither the clotting time nor the sedimentation time of the blood suffers any change following uro-selectan injection. It appears, therefore, that there is no danger of thrombosis or emboli. In 700 cases we have seen a mild thrombosis at the point of injection only eight times, and for the most part these thromboses appeared six to eight days after injection. Local damage to the intima of the vein and not the solution itself was undoubtedly the cause of these thromboses.

This short theoretical detour was necessary in order to acquaint you with the action of uro-selectan on the organism itself. The clinical investigation has indicated that the estimation of a four-hour residue of uro-selectan in the blood can be used as a general

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retention test of kidney function. This retention test parallels the indican test in the blood.

In glomerular damage we obtain poor or no pictures, especially in cases of pyogenic parenchymatous infections, and in many cases of tuberculosis and tumours. Conditions causing retention, which result primarily in tubular damage, give, even in advanced states, good pictures.

Under natural conditions, as in pyeloscopy, expulsion of uro-selectan can be followed in serial pictures. Fluoroscopic visualisation of the urinary tract is possible only in cases of marked stasis. It cannot be generally employed, as a 5 per cent. solution of uro-selectan in the urine is not of sufficient concentration. I wish to thank Dr. Rave, Director of the *X*-ray Department of St. Hedwig's Krankenhaus, for his study of this question and for his great co-operation in the *x*-ray work.

Schaffhauser has shown that only a 15 to 20 per cent. solution of uro-selectan gives as intense a shadow as sodium bromide or umbrenal. We use uro-selectan in this concentration, as do Pratorius, Boeminghaus and Weber, for instrumental pyelography, and can recommend the employment of uro-selectan for this purpose, due to its tolerability and absolute lack of irritating properties.

The mechanics of the ureter can be studied by intravenous urography. Not only can we observe peristalsis and its disturbances, but one can diagnose with surety a sidewise swinging and displacement of the ureter, kinking and looping of the ureter, and narrowings and isolated dilatations which occur.

A great advance in roentgen examination of the urinary tract has been reached in that intravenous urography can be used in those cases in which cystoscopy fails or is attended with difficulties. It can also be used in those cases in which catheterisation of the ureters or instrumental pyelography cannot be done, or in those cases in which this method gives no definite information. Intravenous urography can also be used in those cases in which instrumental pyelography should not be done, due to the possible injury that might result. Full information concerning the urinary tract can be obtained by intravenous urography in cases of urethral strictures, severe bladder disease, cases of bleeding, cases of ruptured kidneys, cases of fistulæ, and in young children, and in cases of transplanted ureters. Intravenous urography is especially indicated in those cases in which catheterisation of the ureter cannot be done with safety, as in cases of acute and chronic disease of the adnexa, in tuberculosis, in cases of prostatic hypertrophy.

From a clinical viewpoint intravenous urography is indicated in the following conditions:—

(1) Those cases in which, due to anatomical and pathological or technical reasons, it is impossible to use cystoscopy, ureteral catheterisation or instrumental pyelography.

(2) In those cases of ureteral obstruction in which the pyelographic solution cannot be injected beyond the obstruction.

(3) In those cases in which instrumental pyelography carries a risk for the patient.

This group of relative indications can necessarily be enlarged to include those cases in which we do not wish to subject the patient to instrumental procedures, and in which we can obtain sufficient information by means of intravenous pyelography.

A Case of Teakwood Dermatitis.

By ELIZABETH HUNT, M.D. (Liverp.).

(Abstracted from *The Lancet*, 10th January, 1931, p. 75.)

ALTHOUGH it is known that workers with teak may suffer from irritation of the skin, the actual number of cases reported is small.

A man, aged 30, presented himself at hospital on 8th May, 1930, complaining of an irritating dermatitis of the dorsal surfaces of the hands and forearms, the face and neck, and the genitals. He stated that the condition had begun on 10th April, and had lasted three weeks, when he had returned to work for three days, but had been forced to stop again owing to recurrence.

In May 1929 he had had a similar attack, which had lasted three weeks and had been succeeded by boils on the trunk and styes on the eyelids. He was employed as a shipwright, and on detailed inquiry as to the nature of his work it was learnt that he had been transferred from metal plates to woodwork, and he believed that the eruption occurred on each occasion after handling teak.

On examination an erythemato-vesicular eruption was observed on the dorsal surfaces of both hands and on the forearms. The face and neck were erythematous, with marked œdema round the eyes. He complained of extreme irritation. The skin was not abnormal otherwise, and no pathological condition was found on physical examination.

The eruption responded rapidly to sedative lotions but, as in the previous year, after subsidence of the acute condition a small number of boils developed.

When recovery was complete the patient was taken into hospital for observation, to investigate his sensitiveness to teakwood before returning to work. On 4th June he was given a piece of freshly sawn teak (Rangoon) to hold in his hand for an hour. Six hours later he complained of irritation on the backs of the hands. The following day there was an erythematous eruption on the backs of the hands and on the face, and the eyes became œdematous; this condition gradually increased in severity until the third day after touching the wood, when there was a well-marked erythemato-vesicular eruption on the dorsum of the hands, the lower third of the forearms, and the face and neck, and the irritation was severe. The condition readily responded to treatment with ichthyol in a zinc calamine lotion.

The effect of teak dust and various teak extracts on healthy skins was investigated by Hoffmann, and as a result of his experiments he came to the conclusion that the irritant action of teak was due to the presence of free unsaturated resinic acid, especially in the dust of freshly cut wood. Willmott Evans considered that the aromatic oil in the heart wood was the essential cause. In the case under consideration the wood used for the test, though freshly sawn, had been in the timber yard for some time. The dust was not applied and heart wood was not used. Some other explanation must therefore be sought.

The interesting features of the case are: the marked susceptibility to, and the shortness of the time of contact with, the irritant; the early onset of symptoms of irritation, which were localised at first and then gradually spread to other regions, although the source of irritation had been removed; and the similarity in the train of symptoms on each occasion, and in their duration.

The simplicity of the method used to test the case suggests that similar methods might be employed with advantage in those numerous medico-legal cases which are now arising where claims are made for compensation for dermatitis due to dyes and other causes.

Studies in Malaria, with Special Reference to Treatment.

By J. A. SINTON,

LIEUTENANT-COLONEL, I.M.S.

(Abstracted from *The Indian Journal of Medical Research*, Vol. XVIII, No. 3, January 1931, p. 831.)

A GREAT variety of opinion seems to exist as to the best dosage of quinine and the duration of treatment necessary for the cure of malaria. These are points of considerable interest both to the physician and the patient. As malaria is a common disease among the poor population of the tropics and the cinchona alkaloids are relatively expensive drugs, these points have also an important economic aspect.

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Our more precise knowledge of the relationship of dosage and duration of treatment to the production of cure, both clinical and permanent, depends mainly upon the extensive investigations on malaria which were carried out during the War and afterwards. In any discussion of these factors it is necessary to consider separately the palliative effects of the drugs on the clinical manifestations of the malarial fevers and their effects in the production of a permanent cure of these diseases.

(1) Palliative Effects.

As quickness of action is to be aimed at in the amelioration of acute attacks of these fevers, dosage in relation to rapid action is important. The first point to be considered in such a discussion is whether any differences have been found between the effects of different doses in the treatment of infections with each of the three species of malarial parasites. The palliative action of the different forms of treatment seems best evaluated by their effects on the duration of fever and the persistence of parasites in the peripheral blood.

(a) *Dosage in relation to the species of parasite.*

Reports from the literature, combined with the very extensive clinical evidence, indicate that the minimal dosage of quinine needed to control the clinical manifestations of benign tertian malaria is less than that needed in malignant tertian infections. It is also suggested by some workers that an even greater dosage may be required in quartan malaria.

(b) *Relation of dosage to the cure of clinical symptoms.*

From a general study of the enormous amount of literature on the treatment of malaria, it would seem a general rule that, in those areas where *P. vivax* is the common parasite and *P. falciparum* rare, doses of 20 grains of quinine daily are usually considered adequate. In the tropics, however, and more especially in those regions where *P. falciparum* is the predominant parasite and where such infections may assume a pernicious character, 30 grains of quinine seems to be the minimum daily dosage usually recommended during the acute stage of the malarial fevers. Workers in the latter areas have often to depend in practice upon a clinical diagnosis, for neither the time nor the facilities may be available to make an accurate diagnosis of the species of parasite responsible for the fever in all cases. They also realize that mixed infections may not be detected in ordinary microscopical examinations; therefore, in their routine dosage they legislate for the more severe infection, i.e., malignant tertian malaria.

In the investigation of nearly 4,000 cases of malaria carried out during the last 8 years in Northern India, we have always found that a daily dosage of 30 grains of quinine, if properly administered, was effective in controlling the acute clinical symptoms of malaria, in the absence of any complicating disease.

The conclusions arrived at from our experience and from the above evidence are that (a) while 20 grains of quinine may be sufficient to control the acute manifestations of benign tertian malaria, yet a more rapid action is probably obtained with a daily dosage of 30 grains; (b) a daily dosage of not less than 30 grains of quinine is probably required during the acute stages of quartan and malignant tertian infections, and (c) for routine work 30 grains of quinine daily seems the best daily dosage in the acute stages of malaria, irrespective of the species of parasite involved.

(c) *Effects of dosage on the persistence of parasites in the peripheral blood.*

Results support the view that large doses have more effect than small ones in causing a disappearance of parasites from the peripheral blood. This is in keeping with the results obtained in the amelioration of clinical symptoms, which have been discussed in the previous section.

(d) *The effects of daily dosage on the occurrence of relapses during treatment.*

Among over 600 cases of chronic benign tertian malaria investigated in our inquiry, when the temperature had been brought to normal by larger doses, no relapse, either clinical or parasitic, could be detected during the period while a daily dose of 10 grains of quinine in solution was being taken. In many instances the treatment lasted 6 weeks.

From the results of other workers recorded above it seems evident that daily doses of less than 10 grains of quinine in solution are in many instances insufficient to prevent relapse while being taken.

(e) *Conclusions.*

The evidence detailed above indicates that 20 grains of quinine daily for an adult is the minimal dosage which can be expected to produce the most rapid clinical action during the acute stages of malaria. While this dosage may be sufficient in most cases of benign tertian malaria, 30 grains daily seems to be the minimal daily dosage for routine use in the acute stages of malignant tertian and quartan malaria.

(2) Production of a Permanent Cure.

In the production of a permanent cure in any form of malaria the duration of treatment seems to be intimately bound up with the size of the daily dosage of quinine used, and thus with the total amount of alkaloid taken. In malignant tertian malaria little difference could be found by us between the cure rates produced in fresh as compared with chronic infections. It is, however, almost universally recognised that in infections with *P. vivax* the cure rate in these two conditions may vary very considerably under the same forms of treatment.

(a) *Duration of treatment in relation to relapse.*

The following table shows the results of the treatment of 875 patients suffering from chronic benign tertian malaria. The drugs used were quinine sulphate or quinidine sulphate in solution by the mouth. It will be seen from these that in our work also there was found a definite relationship between the duration of treatment and the cure rate. The one anomaly in this table may have been due to the fact that the treatment was an interrupted one.

From the work quoted above it is concluded that the cure rate in malaria rises with the duration of the quinine treatment, when the drug is given in medicinal doses. In chronic benign tertian malaria, this increase in rate is not directly proportionate either to the length of treatment or the total amounts of quinine given.

(b) *Dosage in relation to permanent cure.*

The results recorded in the table show that, under the conditions of our experiments, as the total dosage of the cinchona alkaloids increased so did the cure rate in chronic benign tertian malaria.

The investigations of other observers indicate that better effects in the production of a permanent cure are obtained with larger doses of quinine than with smaller ones. It would also seem that within certain limits of dosage, the duration of treatment as well as the total amount of the drug given, has also an important influence.

While daily doses of from 20 to 30 grains of quinine have been found by most clinicians sufficient to control the clinical manifestations of malaria and produce a permanent cure in a great many cases, yet other workers have at different times reported that such doses have been ineffective in these respects and that they have not eradicated the parasites from the peripheral blood. In consequence of this doses as high as 60 to 90 grains daily, or even more, have been recommended for use in the acute stages of the disease.

The so-called failure of oral quinine in doses of 30 grains daily to produce a clinical cure in some instances

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TABLE.

Alkaloid.	Treatment grains of drug × days of treatment.	Total drug (grains) ÷ total days of treatment.	Total number of patients.	Number lost sight of.	Number not relapsing.	Number of relapses.	Calculated average percentage of relapses.
Quinine.	24 × 10	240 ÷ 10	103	7	21	75	76.8
	20 × 1 30 × 6 T × 7 20 × 7	340 ÷ 14	124	2	19	103	84.0
	30 × 14 20 × 7	560 ÷ 21	186	38	44	104	67.3
	30 × 7 T × 7 30 × 7	770 ÷ 49	82	4	31	47	60.0
	10 × 35 30 × 14 10 × 42	840 ÷ 56	172	15	69	88	55.6
Quinidine.	20 × 7 T × 7 20 × 7	280 ÷ 14	97	1	13	83	86.2
	20 × 21	420 ÷ 21	81	5	12	64	82.8
	21 × 7 14 × 24	483 ÷ 31	14	8	0	6	76.4
	20 × 28	560 ÷ 28	16	0	5	11	68.7

may have been due to a variety of causes: (*a*) the medicine ordered was not taken or the proper quantities were not swallowed; (*b*) if taken, the strength of the mixture was not that ordered; (*c*) the dose was not retained, either voluntarily or involuntarily; (*d*) the drug was not absorbed, owing either to gastro-intestinal disturbances or to being given in a form which prevented complete absorption. During the controlled treatment of 1,505 cases of malignant tertian malaria and 1,873 of benign tertian, carried out in our investigations during the last 9 years, it has never been found necessary to give quinine, or any of the other cinchona alkaloids, in doses larger than 30 grains daily in solution by the mouth, to cure an acute attack of malaria, when steps were taken to eliminate the fallacies mentioned above.

Doses as large as 45 grains daily can usually be tolerated by the average adult for a few days, but this amount seems about the ordinary limit of tolerance in most cases. This is the dosage which has been recommended by most physicians in the cases of severe malignant tertian malaria seen in Central America. The effects of very large doses of quinine were tested at Liverpool, where Stephens *et al.* found that continuous treatment with 20 to 30 grains daily was tolerated for 8 weeks, but only 12 out of 19 patients could stand 45 grains daily for this time. The same workers report severe cinchonism with 90 grains daily for 2 days and found that 5 out of 15 patients could not tolerate doses of 120 grains daily for the same period.

It would seem from these results that an excessive daily dosage of quinine may have an injurious effect on the body and it suggests that such doses may tend to defeat their own object when used to produce a permanent cure.

(*c*) *Conclusions.*

The results detailed above show that by a more prolonged course of treatment the permanent cure rate can be increased, but that the increase is not directly proportional to the duration of treatment or to the total amount of quinine given.

The evidence also indicates that better effects in the production of a permanent cure can be obtained by larger doses of quinine than by smaller ones. It seems probable, however, that the continued use of large doses over long periods may have a harmful effect on the human body, and may even hinder the process of permanent cure.

(3) DISCUSSION OF THE RELATIONSHIP OF THE RESULTS TO THE ROUTINE TREATMENT OF MALARIA.

The results recorded previously favour the view that for the routine treatment of malaria doses of, at least, 30 grains of quinine daily are required to produce the most rapid clinical effects during the acute attack. In our experience when proper precautions were taken to ensure absorption, a dosage of 30 grains of quinine in solution daily was found efficacious in all cases. It seems possible that, in those instances where larger doses have been recorded as necessary, the patient was not absorbing the drug completely, either owing to some gastro-intestinal condition or because the drug was given in a form which did not permit of complete absorption. While doses of 20 grains daily may suffice in most cases of benign tertian malaria, it is probably insufficient to produce the best clinical results in malignant tertian and quartan malaria. A daily dosage of 30 grains of quinine in readily absorbable form would seem to be effective. This dosage would avoid the possible clinical inefficiency of smaller doses and the possibly harmful and certainly disagreeable effects of larger doses.

In the production of a permanent cure 30 grains daily seems to be the maximum daily dosage which can be tolerated by most adults for periods of more than a few days at a time.

Having decided that 30 grains of quinine daily is the optimum daily dosage, for routine treatment, one must now consider what is the optimum duration of treatment. The work quoted above shows that with more prolonged treatment the number of relapses can be reduced. The results obtained by Sinton show that one week of treatment with quinine and alkali will cure a very large percentage of malignant tertian infections. It has also been found that a very high percentage of fresh infections with *P. vivax* can be cured by short courses of quinine. The instances where high relapse rates have been reported after prolonged courses of quinine, properly administered, have almost invariably occurred when a selected population of chronic benign tertian infections was being treated. These chronic cases have been estimated by Wright to form only about 10 per cent. of all patients. Under

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such conditions one does not seem justified in subjecting all patients to the discomfort and expense of very prolonged courses in an attempt to procure a slightly higher percentage of cures. It would seem more reasonable to treat all primary infections with known curative doses (30 grains daily) for a short period (one week) and ensure that during that time the treatment is taken, retained and absorbed in the doses prescribed. Such treatment if properly carried out should cure at least 70 per cent. of fresh malarial infections, and so a very large number of patients would be spared the disadvantages, both pecuniary and bodily, which prolonged administration entails. The smaller percentage of relapse cases could then be dealt with some of the special methods suitable for such cases.

Migraine: Results of Treatment by Ketogenic Diet in Fifty Cases.

By J. C. BARBORKA.

(Abstracted from the *International Medical Digest*, Vol. XVII, No. 4, October 1930, p. 196.)

SOME of the recent ætiologic theories and therapeutic suggestions are of interest in considering the justification of a ketogenic regimen in cases of migraine. Weissmann and Weissmann found apparent changes in the acid base balance. The hydrogen-ion concentration and alkali reserve are normal in the periods of freedom from attacks but a tendency to alkalosis develops 48 hours prior to an attack.

The suggestion that migraine is sometimes a phenomenon of protein sensitization is not new. It does seem that the character of the diet plays some part in the explosive phenomena of an attack of migraine if only as a secondary or contributing factor. It is recognised that nervous strain, the vasomotor instability associated at the time of the menstrual period, emotional excitement, fatigue and various psychic phenomena unquestionably are contributory factors, but in many cases it is quite impossible, either physically or psychically, to explain the migraine on such a basis alone, and other factors making the patients susceptible must be found.

Many patients volunteer the information that excessive use of carbohydrates results in a headache, even the taking of a cup of chocolate or a piece of candy. There are also patients who feel that protein is the food that precipitates the attack. In the largest group, the excessive intake of carbohydrates, or an amount excessive for the individual's tolerance, precipitates an attack.

The ketogenic diet, of course, is low in carbohydrate and high in fat. If alkalosis induces migraine, the ketogenic diet which produces ketosis, with an accompanying decrease in the irritability of the nerves, might be an additional inhibiting factor. From the standpoint of an allergic manifestation, because the content of protein in the diet is low, it is possible that there is a chance withdrawal of the specific protein element. Boyden has shown that a diet high in fat promotes biliary drainage, and it has been demonstrated also that duodenal motility occurs after ingestion of fat. Therefore, benefit could be expected in the cases due to dysfunction of the liver and duodenum.

With these facts in mind, it can be seen that the use of the ketogenic diet is not without logic, as potentially it could cover, in a therapeutic manner, all of the foregoing suggestions at the same time.

This form of diet influences the acid base balance and produces certain physicochemical changes in the tissues of the body which deserve a great deal of further investigation and study. This form of treatment is to be applied quantitatively in selected cases as an accurately controlled and supervised experiment rather than to be accepted as a proved specific remedy for migraine.

Fifty patients who were suffering from severe typical migraine were treated with a ketogenic diet. The attacks of 14 patients were controlled. Twenty-five patients were definitely improved. Thus 39 patients were benefited by the diet. Eleven patients were not benefited and the treatment was considered a failure, although a number of the patients were not maintained in a state of ketosis.

Non-Filarial Elephantiasis.

By D. J. HARRIS, D.SC., M.D., F.R.C.S.

(Abstracted from the *British Medical Journal*, 27th December, 1930, p. 1076.)

A CASE of non-filarial elephantiasis recently treated at the Cardiff Royal Infirmary illustrates the value of a modified Kondoleon operation. The patient had suffered for twenty-three years from a complaint which she had come to regard as incurable, and which not only caused her considerable discomfort, but, as she put it, entirely did away with any chances she might otherwise have had of finding a husband.

History.

The patient, A. B., was 40 years of age. At the age of 12 she suffered from a curvature of the spine, tuberculous in origin, and a tuberculous abscess on a rib. When aged 15 she was stung on the left thigh by a wasp; this soon got well. At 17 the left ankle began to swell, but the swelling disappeared overnight. It then reappeared and gradually increased, and a doctor was consulted. He recommended a tight bandage from the knee to the ankle; in the patient's opinion, this drove the swelling from the leg into the thigh.

In 1913, at the age of 23, she was admitted into Guy's Hospital, where lymphangioplasty was performed without result. She was again admitted to Guy's in 1920, and was operated upon by Mr. Davies Colley. The hospital notes were copied by the patient when the nurses were not looking. These notes are so concise that they are quoted in full.

The swelling extends from the ankle to Poupart's ligament anteriorly, and to the level of the iliac crest posteriorly. Patient has angular curvature of the spine.

X-ray Report.—Old caries of the fifth lumbar spine, probably tuberculous; hip-joint negative.

December 9th, 1920.—Operation by Mr. Davies Colley. Anæsthetic, C. and E., followed by ether. A U-shaped incision was made on the dorsum of the left thigh, the loop of the U being about a handbreadth above the knee-joint; the two limbs were carried up to the level of the lesser trochanter. The flap of skin with the adherent adipose tissue was reflected upwards and the deep fascia exposed. An elliptoidal flap of deep fascia was removed, exposing the muscles of the thigh and some fat deep to the fascia. This fat was not as translucent as that under the skin. The enlargement of the limb was thus found to be due to increase of adipose tissue between the skin and deep fascia. Some of the adipose tissue adherent to the skin reflected was excised. The skin flap was reduced in size and stitched back. The calf of the same leg was treated in the same way.

December 10th, 1920.—Wounds dressed, much serous discharge.

December 12th, 1920.—Wounds healing.

January 12th, 1921.—Wounds healed. Circumference of thigh on admission 29 inches; now 26 inches. The leg is diminished in size. There is loss of cutaneous sensibility in a patch of skin below both incisions, but deep sensibility is not impaired.

On the whole, there was only very slight and temporary improvement after the first operation.

Operation.

The patient was admitted into the Cardiff Royal Infirmary on 11th September, 1929, and was operated upon on 14th September. One incision was made in the thigh, extending from the inner end of Poupart's ligament to the adductor tubercle of the femur; another was made in the leg from a point one inch below the

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application of layers of hot paraffin wax is a method for relief of pain that is worthy of trial and has the advantage of being inexpensive. Vaccines find no favour with him, but his arguments against them are hardly convincing. In dealing with gout he has nothing to add to the time-honoured methods of treatment.

The book is pleasantly written and should be helpful to the physician.

J. D. S.

PHYSICAL DIAGNOSIS.—By W. P. Elmer, B.S., M.D., and W. D. Rose, M.D. Sixth Edition. St. Louis: The C. V. Mosby Company, 1930. Pp. 903, with 337 illustrations. Price, $10.00.

THIS volume is a revision of Dr. Rose's work undertaken at the request of the publishers by Dr. Elmer. The book in its present form is divided into two parts and has been largely rewritten. Part I deals with the technique of physical examination and normal physical diagnosis. In this part numerous references are made to pathological conditions to stimulate the student's interest. Part II deals with the physical diagnosis of disease. It is almost completely devoted to diseases of the respiratory and circulatory systems. In Part I there is a most excellently illustrated and valuable chapter on radiology in physical diagnosis. This part also includes a chapter on electrocardiography, which is supplemented in Part II by numerous electrocardiograms illustrating the abnormalities of the heart beat. The book should prove most useful as an adjunct to clinical work. The author has the faculty of making his meaning clear and of investing with interest dry anatomical details and physical methods. It is a readable book. Too much praise cannot be given to the illustrations. They are numerous and above reproach. They add enormously to the value of the book. The book should appeal to the student of medicine learning to master the all-important technique of physical examination. It should also prove of much use to the practitioner as a work of reference.

J. D. S.

THACKER'S INDIAN MEDICAL DIRECTORY, 1931.—Eighth Edition. Calcutta: Thacker, Spink and Co., 1931. Pp. 530. Price, Rs. 6.

THE new edition of this most useful book will be of value to administrative medical authorities, editors of medical journals, medical practitioners generally, and to the lay public. Lists are given in turn of the R.A.M.C. in India, the I.M.S., the I.M.D., of private medical practitioners throughout India, of dentists, hospitals, chemists and druggists, nursing homes, the Queen Alexandra's Military Nursing Service, of nurses and midwives, and of medical missions. Throughout, the classification is by stations listed alphabetically. Thus anyone using the book can find out in a minute the names and addresses of the local doctors, chemists, etc. The book is very well printed and published.

It is of interest to note that the list of private practitioners in Calcutta takes up 35 pages, and that for Burdwan 7 pages,—sufficient evidence of the congested state of medical practice in the big cities of India.

We trust that the medical profession throughout India will support the publishers in this venture, for the information is as complete and accurate as it is possible to make it.

R. K.

ROLL OF THE INDIAN MEDICAL SERVICE, 1615—1930.—By Lieut.-Col. D. G. Crawford, Bengal Medical Service (retd.). London: W. Thacker & Co.; Calcutta and Simla, Thacker, Spink & Co., 1930. Pp. ii plus 711. Price, 21s. net.

COLONEL CRAWFORD'S *History of the Indian Medical Service* is a well-known book, and the author has now laid the entire Indian Medical Service under a debt of obligation to him by the publication of the present work. The labour involved must have been enormous, for, as far as possible, the entries for each individual relate to the date of birth, medical school, degrees and diplomas, dates of successive commissions, date of retirement and of death, service relationships, services of special interest, war services, honours and decorations, and works published. A brief but most interesting introduction deals briefly with changes during the last 15 years, and adds additional information about individuals which had come to hand since the roll was compiled.

The roll itself deals separately from 1615 to 1896 with the Bengal, Madras and Bombay Services, thereafter with the general list, also with such outliers as those serving in the eastern factories, China, and St. Helena. Appendices give the names of officers killed on active service—53 in number; the strength of the Service from 1915 to 1930; in 1915 the cadre was 866, it rose to 1,546 in 1921, and is now at the low figure of 714. No less than 37 officers of the I.M.S. have been elected Fellows of the Royal Society.

The volume is sumptuously printed and bound, and the edition is a limited one of 250 copies only. We trust that every I.M.S. officer in this country will be interested in this historical publication, whilst it will be an essential one in medical libraries, secretariats, etc.

It is rather significant that Colonel Crawford adopts the motto "Ichabod"—(the glory has departed)—on his title page. His dedication of the book—"To the memory of the thousands forgotten, of the few faintly remembered, who, during the past three centuries, have served their King and Country in the Indian Medical Service, these brief records of their careers are dedicated"—will be most gratefully appreciated by all members of the Service.

R. K.

BLOOD-PRESSURE IN LIFE ASSURANCE PRACTICE.—By J. J. Cursetji, M.D., L.R.C.S., L.R.C.P., L.M. & S., F.C.P.S. (Bom.), J.P., and K. J. J. Cursetji, B.A., B.Hy., M.B., B.S., M.R.C.S. (Eng.), L.R.C.P. (Lond.). Published by Dr. J. J. Cursetji: Bombay, 1931. Pp. ii plus 16.

THIS is a small brochure of sixteen pages by the Chief Medical Officer and one of the Medical Examiners of the Oriental Life Assurance Co., Ltd. It gives a clear description of the methods of determining systolic and diastolic pressures. The blood-pressure of healthy men and the significance of variations from the normal are described. The pamphlet contains tables of blood-pressures:—

(1) of men and women of average height,
(2) of American and Canadian men, and
(3) a table of average blood-pressure of Indian lives compiled from 561 proponents from all over India.

The latter appears to show that the average blood-pressure in the Indian is not any lower than in the European.

The brochure is clearly written and contains many valuable hints. It should prove of use to those engaged in life assurance practice.

J. D. S.

MANUAL OF TREATMENT OF GAS CASUALTIES, 1930.—By Command of the Army Council. H. J. Creedy. Published by His Majesty's Stationery Office: London, 1930. Pp. 95. Price, 2s. net. (Obtainable from Messrs. Thacker, Spink & Co., Calcutta and Simla; Messrs. Thacker & Co., Ltd., Bombay; Messrs. Higginbothams, Ltd., Madras and Bangalore.)

THIS little book is a War Office publication and is issued by authority. We may therefore assume that it is compiled by experts and contains the latest knowledge on the subject.

There can be no doubt that gas will play a large part as an offensive agent in any future war between civilised nations. It is also probable that such an offensive will be directed against the civilian population as well as the fighting troops. It is therefore necessary that all medical men should know something about the effects of poisonous gases, the treatment of "gassed" cases, and above all the prophylactic measures that are so effective against this insidious method of attack. This little book can be read with

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great interest. It contains information that will not be found elsewhere, and this information is given in a concise and practical manner.

We learn that these poisonous gases are divided into six classes according to the pathological effects they may cause. There are, of course, many varieties of gas in each class. It appears that the vesicants, of which mustard gas is the most important, are responsible for most of the casualties, but seldom cause fatal results. The methods of prevention and treatment of casualties from each of these classes of gas are described, and it is interesting to know that the respirator gives full protection against almost all so far as the respiratory system and the eyes are concerned.

This book is indispensable for military medical officers. It will become indispensable for all if and when there is another great war.

H. H.

LABORATORY MEDICINE.—By D. Nicholson, M.D. London: Henry Kimpton, 1930. Pp. 433. Illustrated with 108 engravings and a coloured plate. Price, 28s. net.

THE author is essentially a laboratory worker, but in order to enable himself to see the subject from the view-point of the general practitioner he has from time to time during his vacations taken charge of a busy general practice. The result, as far as the reader of the book under review is concerned, is highly satisfactory. The book, in its conception, is not original —many excellent books of its kind have been published on each side of the Atlantic—but it has original features; many of them are, in the opinion of the reviewer, to be commended, others do not appeal to him. The short summaries of the technique at the beginning of each chapter are very useful. These summaries are obviously for the use of the practitioner or technician who has been familiar with the detailed procedure in the past but requires his memory to be stimulated. There is, however, a danger that the student will commit them to memory in order to satisfy his examiners, leaving himself totally unable to carry out the detailed procedure in practice. The use of "bold face" for these summaries and in the text whenever a particular point has to be emphasized is to be commended, but it is not clear why the author has employed this type throughout the first ten and the last ten pages of the book. In the absence of the ordinary type the effect of contrast is lost and the general result is merely clumsy. Again, end-papers were not intended to bear printed matter and should not be so employed.

The procedures advocated are usually the simplest and the soundest, and the description of them is clear and concise. Illustrations have been inserted wherever they are likely to be of assistance. These are well chosen and well reproduced.

The author is not an advocate of routine examinations for ordinary purposes, either in hospitals or in practice, unless the results are to be collected and used for scientific purposes, and his book—unlike certain others of its kind—is not indiscriminate propaganda for the clinical laboratory, but a well-balanced piece of liaison work to bring about a better understanding between the physician and the laboratory worker.

L. E. N.

CLINICAL CHEMISTRY IN PRACTICAL MEDICINE.—By C. P. Stewart, M.Sc. (Dunelm), Ph.D. (Edin.), and D. M. Dunlop, B.A. (Oxon.), M.D., M.R.C.P. (Edin.). Edinburgh: E. & S. Livingstone, 1930. Pp. ix plus 246. Price, Rs. 5-10. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

IT is undisputed that biochemistry plays a very important part in the practice of medicine and surgery, especially in helping the diagnosis and prognosis of the cases. It is, therefore, gratifying to note that within the last 15 or 20 years much advance has been made in the development of this subject and the knowledge of its principles has grown from more to more and is now more widespread among general practitioners than at any time before. Even among those die-hard conservative physicians who used always to be sceptical about its practical value and to look upon it as a modern "fad," it has become a subject of increasing popularity. One can well understand the reason for the extreme scepticism that at one time prevailed as to the practical usefulness of the subject, because it happened to be a highly technical one and it was largely the province of the specialist rather than the ordinary practitioner, who would bestow nothing but cursory attention to the subject.

In order to appreciate the rôle that chemical pathology plays in its application to clinical medicine, the subject must be brought down to clearer and simpler heads and forms, and we are pleased to note that during the last few years attempts are being made towards this end.

We welcome the present volume, not because it is a text-book on biochemistry, meant only for laboratory workers, but because it is written in a clear, lucid and simple style, so as to give as much information as required to general practitioners, house physicians and senior medical students, so as to make them understand the subject clearly and to interpret the results of the various laboratory tests.

The book deals only with the more important and reliable laboratory tests which have a direct bearing on the cases in their clinical investigations. It is by no means an exhaustive treatise on medical biochemistry.

The subject of basal metabolism (Chapter III) has been dealt with in a clear style and the perusal of this chapter by the general practitioner will remove some of the bugbears usually associated with this branch of biochemistry. The sixth chapter dealing with albuminuria and tests of renal function has also been written well and will repay perusal.

In conclusion we remark again that a close co-operation between the biochemist's laboratory and the clinic is essential in successfully carrying out any clinical investigation, and as this book has achieved that object we heartily recommend it to those for whom it is intended.

J. P. B.

OPERATIVE GYNÆCOLOGY.—By H. S. Crossen, M.D., F.A.C.S., and R. J. Crossen, M.D. Fourth Edition. St. Louis: The C. V. Mosby Company, 1930. Pp. 1078, with 1246 illustrations and 2 coloured plates. Price, $15.00.

THIS is an immense volume of over a thousand pages which covers the whole field of gynæcological technique and is a volume which should be only in the hands of every operating surgeon on the staff of a hospital; for only very wide practical experience could differentiate the respective values of so many varieties of operative technique. Nevertheless the way it is written and printed, together with the supreme excellence of its illustrations, make it a masterpiece, and this edition is of particular value to gynæcologists in the tropics; for the chapters which deal with urinary fistulæ and diseases of the intestinal tract in relation to pelvic surgery are wonderfully clear and explicit. Moreover the section of 40 pages dealing with the methods of anæsthesia is a small volume in itself. Dr. Crossen and his brother are to be congratulated on producing for Anglo-Saxon readers a book without bias and of extreme utility to all operative gynæcologists and surgeons.

V. B. G-A.

A TEXT-BOOK OF GYNÆCOLOGY.—By A. H. Curtis, M.D. Philadelphia and London: W. B. Saunders Company, 1930. Pp. 380, with 222 original illustrations. Price, 24s. net.

THIS delightful book conveys to the reader exactly what is intended, that is a personal record of personal experience and an exposition of all that the author believes is vital in gynæcology. The illustrations are

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excellent. I have read no book of recent years which has the appeal and distinction of this volume.

V. B. G-A.

A SHORT PRACTICE OF GYNÆCOLOGY.—By H. Jellett, B.A., M.D. (Dub.), F.R.C.P.I., and R. E. Tottenham. Sixth Edition. London: J. & A. Churchill, 1930. Pp. x plus 525, with 4 coloured plates and 360 illustrations (many in colour). Price, 21s. net.

THE sixth edition of Jellett's *Short Practice of Gynæcology*, fully revised and brought up to date by Dr. Tottenham, late Assistant Master of the Rotunda and now Professor of Obstetrics and Gynæcology at the University of Hong Kong, should be well received by all students because it deals in a short space with all the essentials for the usual final examination in gynæcology, and gives in a concise form the best of the Dublin teaching. All the latest work has been included and the advantages of the newer methods of diagnosis clearly set forth.

Chapter II incorporates the recent work of Mr. Beckwith Whitehouse on the essential part played by the pituitary gland in the function of ovulation and menstruation, and a difficult subject is made to appear quite simple. Chapter III gives the essentials of cystoscopy necessary in gynæcology and describes the methods adopted by Kelly.

The chapter on diseases of the cervix gives clear advice as to when to use caustics, and when radial cauterization and when diathermy may be of use. Likewise the chapter on malignant disease sets forth the value of radium, *x*-rays, and the Wertheim and Schauta operations, there is also a short note on lead treatment; the percentage of cures, by either method, as obtained at the best clinics, is given.

Sampson's teaching on the development of chocolate cysts of the ovary, and implantation adenoma is explained, but nothing is said of the other accepted theories. The note on the dangers of palliative treatment of "fibroids" should be carefully read by all Indian students. The chapter on genital atresia is short and to the point, there is no mention of treatment by total hysterectomy in cases of combined hæmatocolpos, hæmatometra and hæmatosalpinx.

Dr. Rowlette, late pathologist to the Rotunda, gives some very useful notes on vaccine treatment and the use of tuberculin residue in gynæcology. The chapter on sterility is nearly all new, the diagnostic value of Rubin's test and Lipiodol injections is explained and the way to do these tests is described. There is a good chapter on ante-operative preparation and a note on the value of pre-operative blood transfusion. The methods of sewing up the abdominal wall are well described, but the method of post-operative care suggested does not follow very modern lines.

The usual gynæcological surgery, both vaginal and abdominal, is clearly described with good diagrams, and the book should be invaluable to the student who attends the operation room every day.

The chapter on vesico-vaginal and vesico-uterine fistulæ is very optimistic and there is no mention of the careful after-care so necessary for success, nor of the Coffey operation for inoperable fistulæ from below.

V. B. G-A.

LESSONS IN MIDWIFERY FOR NURSES AND MIDWIVES.—By M. C. Anderson, L.R.C.P.E., L.R.C.S. (Ed.). London: A. & C. Black, Ltd., 1930. Pp. xiii plus 213, with 21 illustrations. Price, 6s. net.

THE author's aim in this book is to give a description of the ordinary methods of treatment and diagnosis and this has been carefully done, omitting "superfluous details which are of little use to the midwife."

The anatomy and physiology of the pelvic organs are briefly described. The mechanism of normal labour is carefully illustrated and well dealt with. The author's treatment of post-partum hæmorrhage and of puerperal sepsis with retained products of conception will not be generally accepted. Routine intra-uterine douches are advocated. Prolonged stay in bed during the puerperium, ten days for a multipara and fourteen days for a primipara, is recommended. Such practice is not universally sanctioned.

Apart from these points, well balanced accounts of the ordinary conditions a midwife has to deal with are given. A special feature is the appendix which contains very valuable information. The index is good and the table of contents sufficiently descriptive. The book is extremely well produced and illustrated and can be thoroughly recommended to maternity nurses.

V. B. G-A.

OBSTETRICS FOR NURSES.—By J. B. de Lee, A.M., M.D. Ninth Edition. London and Philadelphia: W. B. Saunders Company, Ltd., 1930. Pp. 654, with 267 illustrations. Price, 14s. net.

THE ninth edition of this well-known text-book lives up to its reputation, it teaches all the newest methods as followed in the big American hospitals. The type and printing are excellent and each important point is clearly stated and illustrated by excellent diagrams. Many of the methods described are not suited to this country where the hospital equipment is deficient and where few of the maternity nurses have received a general training, but it would be an excellent work for medical students to read before starting work on the district and also for sister tutors and others, as there is a good scheme for lectures given.

The short notes on giving the different anæsthetics should be helpful to nurses who are called upon to help in this matter for confinement. It is not usual for nurses to take blood-pressures, nor to give intravenous injections, nor to take blood for the Wassermann reaction.

The diets recommended for pregnant patients are such as could only be obtained by the very rich. The advice on delayed action of the bowels in cases of perineal tear should be followed by nurses unless ordered otherwise by the doctor, as it certainly gives the best results. The chapter on hæmorrhages during pregnancy is very inadequate; Braxton Hick's treatment is given first choice in placenta prævia, and the nurse is not told how to do the version, and there is no mention made of applying a Willet vulsellum forceps to the vertex with a weight attachment. The short note on post-partum hæmorrhage is not precise and it seems bad teaching to tell nurses to pack the vagina with anything sterile in such cases, when bimanual compression is a much simpler and more effective method of controlling post-partum hæmorrhage, as well as being much safer for the patient.

V. B. G-A.

EXCESSIVE MENSTRUAL BLEEDING: ITS TREATMENT BY X-RAYS; AND THE MANAGEMENT OF PATIENTS SUFFERING FROM CANCER OF THE BREAST.—Two papers by F. Hernaman-Johnson, M.D. (Aberd.), D.M.R.E. (Camb.). London: H. K. Lewis and Co., Ltd., 1930. Pp. 24. Price, 2s. net.

THESE are two addresses which appeared in London medical journals. Their main object is to emphasize the advantages of *x*-rays in the treatment of menstrual hæmorrhage and of breast cancer.

The author is a confirmed optimist and seems to have had more fortune than his radiological confrères. This of course may be due to luck or to a careful selection of cases; for most gynæcologists of wide experience extending over years are not of opinion that *x*-rays are in 90 per cent. of cases successful and without risk. My own experience of numberless cases, treated in Europe and in the East, is that the psychical symptoms of the menopause subsequent to over-enthusiastic radiological treatment are more serious and more permanent than those of surgery. As regards breast cancer it would seem that surgery combined with radium and *x*-ray therapy offers the best results; for it would appear from recent statistics that only 20 per cent. of women with breast cancer are alive at the end of 10 years.

V. B. G-A.

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INFANT NUTRITION: A TEXT-BOOK OF INFANT FEEDING FOR STUDENTS AND PRACTITIONERS OF MEDICINE.—By W. McKim Marriott, B.S., M.D. St. Louis: The C. V. Mosby Company, 1930. Pp. 375, with 53 illustrations. Price, $5.50.

As a text-book this volume of over 300 pages may frighten the student by its size, but if one glances through the chapters one soon finds that the first seven deal with elementary physiology, which the student already knows. These chapters are not complete but they serve the useful purpose of reminding the student and doctor that it is necessary to think of the infant's diet in terms of physiology, if pathological conditions are to be avoided.

The chapter on stools in infancy is good as it explains the dietetic errors causing the different types of stools. The advice on the various methods of feeding is clear and precise, the chapter on acid milks is especially useful. The artificial foods described are not ones found on the general market in India. Of the usual diseases of infants each has its chapter on diagnosis and treatment; under the heading "Common causes other than dietetic for intestinal disturbance" there are 8 pages dealing with otitis media and mastoiditis, and on reading them one has the pious hope that all doctors will be competent to use an auriscope on an infant and be able to recognise a pathological drum, and that mothers will permit an early paracentesis. The methods described for collecting urine, etc., are practical, as are the notes on blood transfusion, but one would not like to use citrated blood kept for days in the ice chest, as one finds blood spoils so quickly in this country.

Throughout the book the illustrations are excellent.

V. B. G-A.

CONGENITAL CLUB-FOOT (TALIPES EQUINO-VARUS).—By E. P. Brockman, M.Chir., F.R.C.S. Bristol: John Wright & Sons, Ltd., 1930. Pp. viii plus 110, with 92 illustrations. Price, 10s. 6d. net.

THIS monograph is based upon work which was carried out whilst the author was Chief Assistant in the Orthopædic Department of St. Thomas's Hospital and was awarded the Robert Jones Gold Medal for 1928, given by the British Orthopædic Association. The opening chapter gives a very interesting summary of the literature of the subject from the days of Hippocrates down to the present time. This is followed by an account of the normal anatomy of the foot and the pathological changes which are met with in the various grades of the deformity. The author rejects the mechanical theory of causation as not based upon any sound evidence and finds, as the result of his investigations, a failure of development of all the structures of the foot, which results in a congenital subluxation of the astragalo-calcaneo-scaphoid joint and a shortening of the muscles which control the socket for the head of the astragalus, both as regards its size and movements. Manipulative treatment is dealt with in detail and the indications for open operation in cases where it has failed are clearly set out. Bone operations are advised as a last resort and even then should be delayed until as near puberty as possible. The bone operation advised in these cases is a triple arthrodesis on the lines of Dunn's operation. The treatment advised is in accord with the best modern teaching, the account of the pathology is admirably illustrated and the book can be heartily recommended to all surgeons who have to deal with these cases, so common in this country.

W. L. H.

THE MODERN SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS.—By Bernard Hudson, M.A., M.D. (Cantab.), M.R.C.P. (Lond.), Medical Superintendent, Victoria Sanatorium, Davos-Platz; Late Assistant Physician, Royal Chest Hospital, City Road, London, etc. London: Jonathan Cape. 1930. Pp. 128. Price, Rs. 3-12. Obtainable from Butterworth & Co. (India), Ltd.

THIS little book is one of the excellent *Modern Treatment Series*, each dealing with lines in which notable advances have recently been made. Pulmonary tuberculosis is a realm into which surgery has only recently penetrated, but the results which have so far been achieved are very remarkable and hold great promise for the future. The first half of the book deals in detail with artificial pneumothorax, a procedure which, though strictly speaking surgical, has been taken over by the physicians. The technique, complications, indications and contra-indications are all lucidly described. The division of pleural adhesions by means of the thoracoscope and cautery, a very difficult procedure, is then taken up, after which we reach the sections dealing with extra-pleural thoracoplasty and phrenectomy, the portions which will be of most interest to surgeons. The ultimate aim of all these procedures is the same, to put the lung at rest by inducing collapse and the simplest way of doing this is by the production of a pneumothorax, but there are cases where the presence of adhesions renders this impossible, others where the lung fails to re-expand, and others where the economic condition of the patient does not permit the long-continued treatment necessary for the maintenance of a successful pneumothorax. It is for these cases that thoracoplasty is suitable, but great care must be taken in selecting cases to exclude those with disease of the opposite lung or foci of tuberculosis elsewhere. On all these points the rules laid down for guidance are simple and the descriptions of the various procedures are easy to follow. Some of the summaries of apparently hopeless cases cured by thoracoplasty are very striking. Phrenectomy is regarded by the author as an operation of limited utility, its main value being as a preliminary to thoracoplasty.

This new branch of surgery is of special interest in this country, where the economic aspect of the treatment of tuberculosis is so important that any method which promises to shorten the period of treatment is worth trying out. The wholesale adoption of these methods is sure to lead to disaster, however, unless both physician and surgeon will devote careful study to the proper selection of cases. For this purpose this book can be heartily recommended as a sound guide in small compass.

W. L. H.

A TEXT-BOOK OF HISTOLOGY.—By A. A. Maximow. Completed and edited by William Bloom. London and Philadelphia: W. B. Saunders Co., Ltd., 1930. Pp. 833, with 604 illustrations. Price, 40s. net.

THIS text-book on histology was completed and edited after the death of Professor Maximow by Dr. Bloom. It is the best text-book on histology that has been written in the English language, and should be in the library of every person who has to deal with histology and pathology. The illustrations are perfect and give very clear histological pictures of the different tissues of man. The chapter on blood, blood forming and destroying tissue, is extremely good, and gives a very clear description of the different cells connected with these processes. The same high standard is maintained throughout the different chapters of this book, and the one on the endocrine glands is particularly good. There is no book on histology that gives such a clear and vivid description.

It has been a pleasure to review this text-book on histology, and if this high standard could be maintained before publication was allowed we should have very many fewer books claiming to be text-books on medical subjects.

H. W. A.

MODERN SKIN THERAPY.—By H. D. Haldin-Davis, M.D., F.R.C.S., M.R.C.P. London: Jonathan Cape, Ltd., 1931. Pp. 128. Price, Rs. 3-12. Obtainable from Messrs. Butterworth & Co. (India), Ltd., Calcutta.

THIS book is a small monograph of the *Modern Therapy Series*, and attempts to deal with the treatment of the commoner skin diseases. There is nothing new advanced in the treatment of these common complaints which cannot be found in any ordinary text-book. The difficulty which most medical men have

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when dealing with skin eruptions is in the diagnosis. The dermatologist is usually consulted in order that he may give a name to the lesion which will then enable the practitioner to try various lines of treatment.

The first disease to be considered is eczema, which is not a disease but a clinical entity due to many causes, and it is very necessary to diagnose the cause before any treatment can be advocated. The section on mycelial infections deals largely with the *x*-ray treatment of this disease, a method which is of very little use to physicians in this country, who are not located in large towns where *x*-ray treatment is available. No mention is made of the value of gentian violet in the treatment of Trichophyton infections of the scalp as well as in favus. The importance of dealing with the primary focus of ringworm of the skin, i.e., between the toes and the nails, is not mentioned, and hence the statement is made that ringworm of the glabrous skin is often very difficult to control.

A chapter each is devoted to actinotherapy, protein shock and minor skin surgery. This book has very little to recommend itself to the reader, as whatever it contains can be found in any well-known text-book on dermatology.

H. W. A.

RECENT ADVANCES IN ENTOMOLOGY.—By A. D. Imms, M.A., D.Sc., F.R.S. London: J. & A. Churchill, 1931. Pp. viii plus 374, with 84 illustrations. Price, 12s. 6d. net.

As the author states in his preface "The day of the general entomologist is passing by, and it is becoming increasingly difficult for any one individual to view the subject in full perspective." No one can feel this truth more than the practising entomologist whose student days are now far behind him, and who for years has been engaged in some specialised aspect of the science. To again quote the author, the book "does not presume to instruct the specialist in his own field." But while every worker has his own selected list of periodicals, plus occasional new volumes, which help him to keep abreast of his own aspect, it is becoming increasingly impossible,—well-nigh, if not yet quite, as much as in medicine,—for the entomologist to keep in touch with branches of his science which no longer actively concern him, and many of which he has been out of touch with since student days, even if they then existed at all.

Perhaps, in an occasional article in some periodical such as *Nature*, the economic entomologist has read a little of the recent work in palæo-entomology of Tillyard, or in a rapidly skimmed volume of *Transactions of the Entomological Society* a paper by Eltingham on insect-vision has caught his eye, and, as like as not escaped study for lack of knowledge of earlier work on the subject. To anyone who desires to know what is being done in these, and many other abstruse subjects, the present volume will be invaluable. He will close each chapter with the feeling that he is once more in touch with his science in its pristine purity, away from the economic thoroughfares he has been forced to tread for many years. He will realise that all "recent advances" are not recorded in the pages of the *Review of Applied Entomology*, that there still exist, out of sight and general ken by the busy practitioners of entomology, a body of scholars carrying forward the researches of those whose work is for ever embodied in the text-books of his youth.

Except on the most rigorously practical side, the whole field is more or less covered. The most recent work, up to last year indeed, on the morphology of the body parts, on metamorphosis, sense organs and reflex behaviour, coloration, and palæontology, take up just half the book. The second half is somewhat more practical, and probably familiar to the average professional worker, dealing with ecology (four chapters), parasitism (two chapters), thus leading up to a final pair on biological control. One great omission there seems to be, nothing is said of recent work in insect physiology.

The one criticism that we have to make, referring to the whole work, is that advances on the medical side are hardly given any attention at all. The great studies of Patton and Cragg on the structure and development of the proboscis in the Muscidæ, for instance, are not even mentioned. In ecology, nothing is said of the work of the last ten years on Culicidæ, but these blemishes will be less important to readers of the *Indian Medical Gazette* than to most, as it is just these aspects that their professional interest in the subject will have rendered them most familiar with. In a small volume like the present one cannot hope to find everything mentioned, and what is most urgently needed is mention of those subjects one is likely to be least familiar with. But it is captious to criticize further. The book is simply invaluable as an authoritative précis by a leader of the science which no one, even though he be a newly graduated entomologist, can possibly afford to be without. Whatever his speciality, he must turn for it from his shelves from time to time, either for direct information, or equally likely, for reference to the admirable classified bibliography which closes each chapter.

R. S. W.

Annual Reports.

ANNUAL REPORT FOR 1929-30 OF THE UNION MISSION TUBERCULOSIS SANATORIUM, AROGYAVARAM, MADANAPALLE, SOUTH INDIA.

As usual, this annual report is a record of pioneer work carried out on the subject of pulmonary tuberculosis in India. During the year 327 patients were admitted, 317 discharged, leaving a residue of 199 patients on 30th September, 1930. The number of beds available is 199. All classes, communities, races, and occupations are represented. The following figures deal with the results obtained.

Results.

Of the 257 cases, 185 or 72 per cent. were discharged with "positive results," viz., 65 as "arrested," 86 as "much improved" and 34 as "improved." Among the patients discharged with "negative results," 20 were discharged as "stationary," 28 as "worse" and 24 died.

Taking I and II stages together (108 cases) which are the cases most suitable for sanatorium treatment, the "positive results" were 100 or 92.6 per cent.

Of the 54 cases in I stage, 52 cases or 96.3 per cent. were discharged with "positive results," viz., 46 or 85 per cent. as "arrested," 5 or 9.3 per cent. as "much improved" and 1 or 1.9 per cent. as "improved."

Of the 54 cases in II stage, 48 or 88.9 per cent. were discharged with "positive results," viz., 19 or 35.2 per cent. as "arrested," 23 or 42.6 per cent. as "much improved" and 6 or 11.1 per cent. as "improved."

Of the 149 cases in III stage, 85 or 57 per cent. were discharged with "positive results," viz., 58 or 38.9 per cent. as "much improved" and 27 or 18.1 per cent. as "improved."

If we consider those cases in the different stages who were discharged as "arrested," "much improved," and "improved," the results are:—

	Arrested.	*Much Improved.*	*Improved.*
I stage	85 per cent.	9.3 per cent.	1.9 per cent.
II "	35.2 "	42.6 "	11.1 "
III "	—	38.9 "	18.1 "

These figures emphasize in the most striking way the very great importance of sending patients for treatment as early as possible.

If we sub-divide the stages into three sub-divisions, A, B, and C, indicating in addition to the usual

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classification also the general systemic disturbance of the patient, we find the results as follows:—

	Total number discharged.	Arrested.		Much improved.		Improved.		Stationary.		Worse.		Died.	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Stage I A	40	34	85	4	10	..	..	1	2.5	1	2.5	..	..
" I B	13	11	84.6	1	7.7	1	7.7	..	..	..	..	..	..
" I C	1	1	100	..	..	..	..	..	..	..	..	..	..
TOTAL ..	54	46	85	5	9.3	1	1.9	1	1.9	1	1.9	..	..
Stage II A	23	14	60.9	8	34.8	1	4.3	..	..	..	..	..	..
" II B	20	4	20	14	70	..	..	2	10	..	..	..	..
" II C	11	1	9.1	1	9.1	5	45.5	3	27.2	..	..	1	9.1
TOTAL ..	54	19	35.2	23	42.6	6	11.1	5	9.2	..	..	1	1.9
Stage III A	20	..	..	15	75	3	15	..	..	2	10	..	..
" III B	47	..	..	19	40.3	14	29.9	5	10.6	3	6.4	6	12.7
" III C	82	..	..	24	29.3	10	12.2	9	10.9	22	26.8	17	20.8
TOTAL ..	149	..	..	58	38.9	27	18.1	14	9.4	27	18.1	23	15.5

Fifteen Years' Results on Discharge.

During the fifteen years there have been discharged 2,775 patients who have been more than one month under treatment and who have all been found to be suffering from pulmonary tuberculosis. Out of this number of patients, 1,913 that is 68.9 per cent. obtained "positive results."

Of the 2,775 patients, 22.9 per cent. were in I stage, 30.7 per cent. in II stage and 46.4 in III stage.

The results considered with regard to the different stages are as follows:—

Of 636 patients in I stage, 97.7 per cent. obtained "positive results."

Of 852 patients in II stage, 82.6 per cent. obtained "positive results."

Of 1,287 patients in III stage, 45.7 per cent. obtained "positive results."

The detailed results in the different stages are as follows:—

	Arrested.	*Much Improved.*	*Improved.*
In I stage,	76.0 per cent.	15.6 per cent.	6.1 per cent.
" II "	32.1 "	37.4 "	13.1 "
" III "	1.2 "	26.4 "	18.1 "

Artificial pneumothorax was tried in 122 cases, but in 30 of these it was not possible to collapse the lung on account of adhesions. Of the remaining 92 cases, 58.6 per cent. were discharged with positive results. Sanocrysin was given in 14 cases, tuberculin B. E. in 21, and autogenous vaccines in 11. The surgical side of the work at Madanapalle shows how important surgical measures are now becoming in the treatment of pulmonary tuberculosis; there were 66 phrenic exaircsis operations, and 3 for thoracoplasty. A long list of complications on p. 16 of the report shows how important secondary infections are, and the importance of treating them. The laboratory carried out a very large volume of routine examinations; medical students and laboratory assistants were trained during the year; and several papers were published and many lectures given both in India and by members of the staff on leave in Europe. The report is illustrated by many interesting photographs.

Our readers are fully aware of the invaluable work carried on year in, year out, by this Sanatorium, which may be regarded as the pioneer institution in this country in the treatment of pulmonary tuberculosis. As Dr. Frimodt-Möller has shown, sanatorium treatment can be quite as successful in India as in Europe, if only the sanatoria are placed in the right situations and climate, and properly run. As at Madanapalle, a well staffed laboratory and *x*-ray plant are essential adjuncts to treatment.

ANNUAL REPORT OF THE RADIUM INSTITUTE FOR THE YEAR 1929. BY DR. B. K. ROY, M.B., D.M.R.E., SUPERINTENDENT. PATNA, SUPDT., GOVT. PRINTING, B. & O. 1931.

THIS most interesting report shows that radium treatment is now at last becoming of importance in medical practice in India. Thanks to a donation by the late Maharajadhiraj of Darbhanga the amount of radium, available was increased by nearly one lakh's worth, and with the special applicators now available, the work during the year increased to 40 per cent. more than that undertaken in 1928, 437 patients being attended to as against 314 in the previous year. The Institute continues to be accommodated in a part of the hospital for women attached to the Patna Medical College Hospital, whilst paying patients are accommodated in a special set of quarters, and paying European patients in the Wheeler ward of the Patna Medical College Hospital.

Dr. Roy's report well represents conditions in India. Far too many patients are received in the very last stages of the disease; for example what is the use of sending a patient with an extensive cancer of the throat, gasping for every breath, for radium treatment? This patient had an emergency tracheotomy performed on him, but died two days later. Used early, and with proper precautions, radium therapy can often successfully replace surgery; but to leave radium therapy as the last resort is fatal. We cannot do better in this connection than quote Dr. Roy's own words:

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"The situation has been cleared and we can take a more reasonable view of the situation now. Radium is not a 'cure all,' neither can it cure all cases of cancer. All that is claimed is that in the treatment of malignant conditions, the proper and scientific use of radium has a value and sphere of activity that is not possessed at the present moment by any other agent of our present-day medicine or surgery. The spectacular results obtained in some cases are not usual for all, and such expectations can only lead to disappointment. Very advanced cases of malignant disease with distant metastases cannot be cured with radium, as can be easily understood from a study of the nature and action of the agent. The most that can be expected is a certain degree of palliation in some of these cases and some prolongation of life.

A very large part of our work here consists in the treatment of these very advanced cases of cancer sent to us as a last resource after other methods of treatment have been tried and have failed. The idea in most cases is that everything possible having been done for the patients, let us see what radium can do now. Many of these cases when they reach us in a cachectic condition we are unable to treat, and those that we do treat receive very little benefit. The conclusion that the patient's friends and frequently the doctor come to is that radium has been tried and failed and therefore is no good. Radium of course will fail when the impossible is attempted. It is not always possible, however, to refuse to treat many of these cases for fear of the extreme mental shock likely to be caused by the disappointment caused by such refusal which may even end in suicide.

It may perhaps be helpful if I attempted to give some sort of classification as to the relative value of radium in the treatment of different diseased conditions. In malignant disease our lot has been up to now to deal mostly with all the deadwood of other hospitals. Such materials are useless for purposes of any comparative statement. It is well known that many varieties of cancer if excised return almost immediately with much greater virulence. There is also a large group of border line cases, and comparison of radium successes and failures of these cases on the one hand, with the disabling deformities of surgical successes, and the pitiable condition of the surgical failures on the other, are sufficient justification for me to press the claims of radium as a therapeutic agent of immense possibilities. In the treatment of inoperable or post-operative carcinoma and other malignant disease, when nothing further can be done and the doctor and patient alike feel equally helpless, radium will often alleviate suffering and prolong life in comparative comfort, in many instances bringing about complete freedom from all clinical manifestation of the disease for a considerable period of time: sometimes even a clinical cure. The same can be said for leukæmia, Hodgkin's disease and toxic goitre.

For such disease as menorrhagia, metrorrhagia, uncomplicated cases of uterine fibroids, rodent ulcers, chronic eczema, psoriasis, tubercular glands (pre-suppurative), keloids, angiomata, etc., application of radium is an excellent therapeutic measure bringing about complete relief in a short time with practically no discomfort and risk to the patient."

PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOOR. ANNUAL REPORT FOR THE YEAR 1929. BY MAJOR K. R. K. IYENGAR, I.M.S., MADRAS, METHODIST PUBLISHING HOUSE, 1930.

THIS annual report is of very considerable interest, though the reader will find that he has to dig—so to speak—for the information contained in it. It covers only the ten months from the 1st March to the 31st December, as at a conference of Directors of Pasteur Institutes in India in December 1929 it was decided that all annual reports of such institutions should cover the calendar year.

The report is briefly divisible into two sections, with statistical tables for (*a*) those treated at the parent institute at Coonoor, and (*b*) those treated with vaccine issued throughout the Madras Presidency. The former numbered 607, as against a number of 242 in the previous complete year, 1928-29, chiefly owing to a severe outbreak of rabies amongst jackals in the Nilgiris District in the middle of the year. No less than 304 patients were treated in connection with this outbreak, the origin of which still remains obscure. Most patients were admitted within four days of having been bitten, and there were no deaths from hydrophobia among those treated.

One is glad to see that the Coonoor Institute still adheres to a uniform dosage for patients,—5 c.c. daily of a 1 per cent. emulsion of fixed virus in carbolised saline for 14 days. (There is always a temptation for newly appointed Directors of Pasteur Institutes to introduce "intensive" methods of treatment, without realising the dangers thereby incurred. There was no case of neuro-paralytic accident during the year, and one must attribute this to Major Iyengar's care in adhering to lines already laid down as safe.) At Coonoor the patients treated show a total hydrophobia rate of 0.86 per cent., and a failure rate of 0.73—figures which are very good under the special circumstances reported.

A special feature of all antirabic work in India is that it can hardly ever be proved whether the biting animal was or was not rabid. This is well brought out in Table V of the report; out of 607 patients treated at Coonoor, 490 or 80.7 per cent. were treated on the presumption that the biting animal was rabid, from a consideration of its history. In only some 8 per cent. of persons bitten was it certain that the animal had rabies. Deep wounds constituted 48 per cent. of patients, with a failure rate of 1.37 per cent. "Class IV"—deep and extensive wounds on all parts of the body, including all bites and scratches on the head and neck,—75 cases,—showed a failure rate of 2.66 per cent.

Part II of the report deals with vaccine issued from the Institute, and here the figures concerned show the tremendous growth of such issues, from treatments for 1,248 patients in 1922-23 to treatments for 5,381 patients in the last ten months of 1929. Nearly 40,000 persons have been treated throughout the Presidency with vaccine issued between 1922 and 1929. (This represents an enormous saving to Government in railway fares, maintenance allowances, allowances to attendants, etc.) The total hydrophobia rate was 0.97 per cent., and the failure rate 0.73—figures which correspond very accurately with those for patients treated at Coonoor. As usual, jackal bites are always more severe than dog bites,—total hydrophobia rate 2.0 per cent., failure rate 1.0 per cent. "Class IV" here comes out badly, with a failure rate of 3.76 per cent.; and it would seem best to adhere to the policy of treating such special cases at the central institute, rather than at local centres.

Major Iyengar is to be congratulated on this report. It tells of a year of steady progress,—especially in the policy of extending outside local centres for treatment. The results for seven years now show that this policy is a sound one, as also a very economic one. It also affords very much wider facilities for widespread distribution of the vaccine than does the treatment of all patients at a central institution.

Correspondence.

MALARIA IN BOMBAY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the footnote on page 704 of your editorial on malaria control in the December 1930 issue of your journal, the following appears:—"During the last financial year, the Bombay Municipality spent approximately Rs. 1,47,000 on malaria control in Bombay. It would appear therefore that vigorous anti-malaria measures are now being taken in Bombay."

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I am afraid that this idea of what is being done in Bombay, for Bombay, by Bombay, will require modification in material respects.

Major Covell, in the summary of his report, states, "I feel confident that endemic malaria in Bombay can be brought under complete control;.....(then, in large type),.....But it is quite certain that this result will not be achieved without the whole hearted adoption of radical and systematic measures" (which measures he has fully and with reason discussed in his report).

Now, the measures adopted in Bombay are neither radical nor systematic. It cannot be truly said that any single recommendation of Major Covell has been put into practice in its entirety: and when it is remembered that Major Covell has rightly stressed,—as did Bentley before him,—the urgent necessity of carrying out to the full all the items of recommendations *in toto* if Bombay malaria is at all to be controlled, it is easy to understand why the money being spent is worse than wasted. The expenditure merely lulls to sleep our petty-fogging aldermen till the next serious epidemic.

The war being waged against the mosquito in Bombay is not a specific "species" war, as proved by Major Covell to be so essential for our purpose, but is a general war against all mosquitoes. In the weekly returns of dangerous places that appear in the Bombay papers under the caption "Anopheles in Bombay," no attempt is made to single out *stephensi* breeding sites. To be frank, the so-called Malaria Department of the Bombay Municipality is in reality a Mosquito Department, attempting a hopeless task with the funds at their disposal, as even ten times the present budget grant will be insufficient to deal with all mosquitoes. As a result, the permanent breeding places of *Anopheles stephensi*,—the crux of the whole problem,—are still allowed to exist, and are allowed to multiply a hundredfold every rainy reason, while the general mosquito population is as happy as ever.

Further, fundamental requirements like unitary control, suitable legislation to enforce proposed measures, etc., still remain to be accomplished.

Can it be said that we in Bombay are even attempting to tackle our malaria problem? It were far better to "do nothing and say so," than to drift into a false position and let the world point an accusing finger at "Bombay the Benighted."—Yours, etc.,

P. A. DALAL, L.M. & S. (Bom.),
D.T.M. & H. (Camb.),
Professor of Bacteriology.

GRANT MEDICAL COLLEGE,
BOMBAY,
12*th January*, 1931.

"DECEASED."

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Some few years ago there was instituted a body entitled "The Royal College of Physicians and Surgeons of India" with its headquarters at Dacca, and was apparently officially registered under Act XVI of 1908. This College granted a "Membership," and it was stated that its object was the furtherance of research work in oriental and allied medical sciences.

After correspondence with official medical authorities, I have now ascertained that this "College" has ceased to exist; its Registrar was fined Rs. 200 by the Subdivisional Officer of Dacca for a "misdemeanour." It would be of interest if the Indian Medical Association, the all-India Ophthalmological Society, the Medical Section of the Asiatic Society of Bengal, the Calcutta Medical Club, and other official medical societies and associations would take note of this—now extinct—institution.

In the same connection, perhaps some of your readers can inform me of the official or other status of the "Royal Academy of Medicine and Allied Sciences of the Punjab," which also claims to be registered under Act XVI of 1908 of the Government of India.

At the same time, it would be a good move if some official society or association could be established for prosecuting research into Indian and oriental medical sciences.—Yours, etc.,

P. K. KURUP, L.C.P.S. (Bom.),
L.M.P. (Madras).

TALIPARAMBA,
MALABAR, MADRAS PRESIDENCY,
23*rd January*, 1931.

INTRAMUSCULAR QUININE IN MALARIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Having read the letter by Dr. D. M. Vasavada in your issue for October 1930 on intravenous quinine, I am prompted to write to you to emphasise the value of intramuscular injections of quinine in malaria. The intramuscular injection is not followed by the fall in blood-pressure which occurs with intravenous injections, the method is easy and safe, whilst the absorption of the drug is slower and its effects more lasting than by the intravenous route.

Dr. Vasavada mentions abscess formation as having occurred in one out of four of his cases by the intramuscular route, but I have given hundreds of intramuscular injections of quinine during my twenty years' service in Burma, both in the Shan States and the Lower Chindwin District, where every year we have epidemic malaria during the rainy season. I have never yet seen a case of abscess, nor the nightmare of necrosis, sloughing, tetanus, etc., so often mentioned in your journal.* The only precautions that I take are thorough sterilisation of the syringe by boiling and to prepare the solution for each injection freshly,—grs. 7 to 10 of acid hydrochloride of quinine in 20 minims of aqua distillata, boiled in a separate bottle on a water bath. The skin is painted twice with tincture of iodine before the injection is given. I have often given 20 such injections a day, and have observed no bad effects; recently I have given some 500 such injections during an epidemic in the Upper Chindwin District.

The intramuscular route represents the principle of "safety first"; further, one cannot give intravenous injections in the jungle, and specially prepared ampoules for intravenous injection are much more expensive than freshly prepared acid hydrochloride solution. I have had considerable experience of the intravenous route, but only use it for patients in hospital who can be kept lying down. The clinical results with intramuscular injections are all that can be desired.

The intravenous method may be necessary for pernicious and comatose cases, but the intramuscular route is preferable for patients who do not respond to oral treatment. The method of choice should be quinine sulphate by the mouth preceded by an alkaline mixture in ordinary cases, and quinine acid hydrochloride intramuscularly for special cases; followed, in all instances, by a follow-up after-treatment, which should never be omitted.—Yours, etc.,

A. S. DAWSON, L.M.P.,
Medical Officer.

KAWA, PEGU DISTRICT,
BURMA,
23*rd January*, 1931.

A PROPHYLACTIC (?) AGAINST SMALLPOX.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—A drug in Hindu medicine which has a certain reputation as a prophylactic against smallpox is *kantakari*—a preparation from the root of *Solanum xanthocarpum* (Syn. Hindi, *kateli, katai, ringni*; Sans.

*(*Note*.—Has Dr. Dawson followed up and seen patients who have received intramuscular injections of quinine six or seven weeks after the injection? It is at this period that the aseptic abscesses which result come to the surface.—ED., *I. M. G.*).

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In high blood pressure and associated symptoms Theominal has proved itself a dependable anti-spasmodic and vaso-regulator. Being non-toxic and non-cumulative it can be used in the treatment of chronic oases. It is a reliable symptomatic in Angina pectoris and arterio-sclerosis. Peroral administration.

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and Bengali, *kantakari*; Telegu, *pinna mulaka, vankuda, nella molunga*). This has been used for many years in Kaviraj medicine. Both I and several of my medical friends have found the administration of this drug to be of value as a prophylactic against smallpox. On several occasions members of a family which have taken it have escaped smallpox, whereas other members of the family who have not taken it have contracted the disease. Of course, one would not suggest its use in place of vaccination, but where vaccination is refused, it may perhaps be of value.

The root is administered as follows:—

About ¼ of a "tollah" (about 40 grains) of fresh root is powdered and ground with 2 or 3 black pepper seeds and made into a bolus. This is the dose for an adult; and a quarter to a sixth of this dose may be given to children. The mixed powder will keep indefinitely for use at any time. This dose is taken on an empty stomach the first thing in the morning for three consecutive days.

The root is available everywhere in India, and is sold in all Ayurvedic shops. It would be of interest to know whether any other medical practitioners have had any experience of the drug.—Yours, etc.,

SATYA KINKAR BISWAS, L.M.P.,
Medical Officer.

KIRKEND, KUSUNDA P. O.,
Manbhum, Jharia Coalfield.

[*Note.*—We have submitted the above to Capt. P. De, Offg. Professor of Pharmacology, Calcutta School of Tropical Medicine, who notes that according to Dr. Wilson (*Calcutta Med. Phys. Trans.*, Vol. II, p. 406) the stems, flowers and fruit are used as a bitter and carminative, and are prescribed in skin lesions attended with vesicular, watery eruptions on the feet. There is apparently no mention of the use of the drug as a preventative of smallpox.—ED., *I. M. G.*].

"TAKO POWDER" IN DYSENTERY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Indigenous drugs may or may not be of value in the treatment of different diseases, but perhaps the following experience is worth recording.

Some time ago I had under treatment an old Parsi gentleman with complete stricture of the urethra and extravasation of urine into the abdominal and scrotal tissues; at the same time he was suffering from acute dysentery with the passage of some 50 stools a day consisting of blood and mucus. The condition was so serious that operation was postponed for a couple of days whilst emetine was administered. On the third day a suprapubic cystotomy was carried out, but the patient's condition was desperate. At this stage, Dr. A. D. Edal Behram, M.B., B.S., Boocher's Bungalow, Malabar Hill, brought an indigenous remedy named "Tako powder" for dysentery to my notice. It is administered in doses of 5 to 15 grains t.d.s. by the mouth. Whatever the cause, in the case of this patient, its administration was followed by complete cessation of the dysentery in two days, and the patient recovered.

Since, then, I have used the powder in other cases of dysentery with very good results. Microscopical examination of the stools to determine the type of dysentery present has not been possible. On the other hand the preparation might be worth pharmacological investigation. Dr. Behram will be glad to supply samples for chemical or pharmacological investigation of the active principles.—Yours, etc.,

J. F. HENRIQUES, L.M. & S., F.C.P.S.,
Medical Officer.

BULSAR,
24th August, 1930.

(*Note.*—We have consulted Capt. P. De, Offg. Professor of Pharmacology, Calcutta School of Tropical Medicine, with regard to the above letter. He reports that "Tako powder" does not appear to be any well known remedy in the indigenous systems of medicine; presumably its action is due to tannins, as with so many other astringent remedies. In our own opinion the number of "remedies" for dysentery ought to be reduced rather than increased, and each one of them subjected to stringent investigation as to their active principles and real therapeutic value.—ED., *I. M. G.*).

Service Notes.

LEAVE.

LIEUTENANT-COLONEL V. B. GREEN-ARMYTAGE, I.M.S., Professor of Midwifery, Medical College, Calcutta, and Obstetric Physician and Surgeon, Medical College Hospital, is allowed leave for the period from 5th April to 3rd July, 1931 (both days inclusive).

PROMOTIONS.

Bt.-Colonel T. G. F. Paterson, D.S.O., M.B., K.P.H., has been promoted to the rank of Colonel with effect from the 17th October, 1930, with seniority from the 1st January, 1923.

The promotion of Major J. M. Shah, M.B.E., to the rank of Major has been ante-dated to the 17th June, 1927.

Captain A. I. Cox has been promoted to the rank of Major from the 14th January, 1931.

Captain V. S. R. Pandit has been promoted to the rank of Major from the 4th January, 1931.

APPOINTMENTS AND TRANSFERS.

The undermentioned officers of the Indian Medical Service have been appointed Honorary Surgeons to the King:—

Major-General J. D. Graham, C.I.E., M.B.

Lieutenant-Colonel J. McPherson, M.B., F.R.C.S.E., who has also been promoted as Bt.-Colonel.

Lieutenant-Colonel S. G. S. Haughton, M.D., has been appointed an Officer of the Military Division of the Order of the British Empire.

Lieutenant-Colonel H. L. Batra, M.C., has been appointed to officiate as Inspector-General of Civil Hospitals and Prisons, Assam, with effect from the 8th January, 1931.

Lieutenant-Colonel T. C. Boyd, I.M.S., is re-appointed as Chemical Examiner to the Government of Bengal and Professor of Chemistry, Medical College, Calcutta, with effect from the 19th Feburary, 1931.

Major P. F. Gow, D.S.O., I.M.S., officiating Second Professor of Midwifery and Gynæcology, Medical College, Calcutta, is appointed to act as Professor of Midwifery, Medical College, and Obstetric Physician and Surgeon, Medical College Hospital, in addition to his own duties, *vice* Lieutenant-Colonel V. B. Green-Armytage, I.M.S.

Major S. R. Prall, M.B., I.M.S., Resident, Medical Officer, St. George's Hospital, Bombay, to officiate as Civil Surgeon, Nasik, *vice* Lieutenant-Colonel A. G. Tresidder, C.I.E., M.D. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), I.M.S., granted leave preparatory to retirement.

Notes.

NEW INSTRUMENTS IN TONSILLECTOMY.

By C. OSMAN BODMAN, F.R.C.S.E.,
Clifton, Bristol.

THE instruments described below have been found of great use in the investigation and after-treatment of tonsil cases. The *tonsil exploring hook* is of a convenient size and shape for lifting the anterior faucial pillar off the tonsil, for raising the tonsil from the

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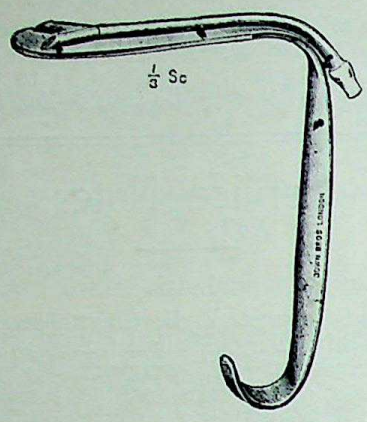
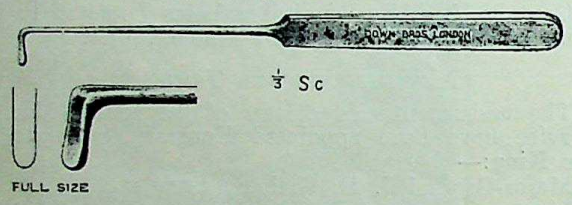
posterior pillar, for pressing upon the tonsil to squeeze out secretion, and for investigating crypts.



The instrument is made in stainless steel, and being somewhat hollowed and rounded, admirably serves the above-mentioned purposes without causing any injury.

The *irrigating tongue depressor*, when connected with a Higginson syringe or irrigating can, serves the purpose of douching the tonsil fossæ with an antiseptic solution after dissection of the tonsils and has proved a favourite with the hospital nursing staff.

To use it, the patient sits forward over a basin so that the lotion runs freely in and out of the mouth.

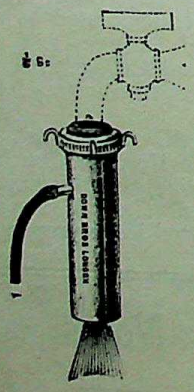


These instruments have been made for me by Messrs. Down Bros. Ltd.

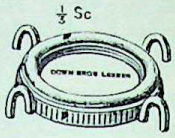
A HYDROSTATIC PUMP.

By Dr. G. A. METCALFE,
Bedford.

FOR some time past I have been using a hydrostatic pump for obtaining suction in operations on the nose and throat, and have been greatly impressed by its value and efficiency.



One great drawback to the usual hydrostatic pump now in use, is the fact that a good head of water, which is essential for its proper function, tends to blow the pump off the tap. I found great difficulty in securing it and suggested to the makers that retaining hooks should be fitted. This has been done with the assistance of Messrs. Down Bros. Ltd., who have brazed to the head four metal hooks, as illustrated, by which the pump can be easily and securely tied on. It may be necessary to have a tap in the theatre adapted to the nozzle, but this can easily be done by any plumber.



The rather objectionable noise of splashing can be silenced to a great extent by fixing a length of wide rubber tubing to the outlet and allowing it to open under water in a basin.

This modification to the pump can be obtained from Messrs. Down Bros. Ltd., St. Thomas's Street, S. E. 1.

THE PREVENTION OF PNEUMONIA.

PNEUMONIA may often be prevented by treating promptly and energetically any attack of bronchitis and influenza.

Pneumonia is easier to prevent than to cure. Notwithstanding the satisfactory results generally obtained by modern therapeutics, the mortality is still high, in spite of all our progress.

In a great number of cases pneumonia is a sequel to bronchitis, to an attack of influenza, or even to a slight infection of the upper respiratory tract. It has been demonstrated that it is difficult for the pneumococcus to invade the normal bronchial and alveolar mucosa, but should resistance be weakened, following an attack of bronchitis or influenza, a pneumococcus invasion may cause pneumonia.

By eliminating the congestion, by stimulating the superficial circulation, by favouring phagocytosis and by establishing a normal circulation in the bronchi and alveoli, the use of prolonged moist heat in the form of Antiphlogistine will assist in preventing the pneumonia, which may follow an attack of bronchitis or influenza.

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Original Articles.

RHINOSPORIDIUM KINEALYI INFECTION.

By P. K. KURUP, L.C.P.S. (Bom.),

Medical Officer, Taliparamba, Malabar.

Rhinosporidium kinealyi was discovered by Col. O'Kinealy, I.M.S., of Calcutta in 1894 in vascular pedunculated nasal polypi, and described by Major Vaughan, I.M.S., Professor of Pathology at the Medical College, Calcutta.* In 1905 Minchin and Fantham published an exhaustive description of the structure of the parasite, and in the same year the late Dr. T. M. Nair of Madras drew the attention of the profession to its existence in the Madras Presidency. No case of *Rhinosporidium kinealyi* has hitherto been reported as occurring in a female in the Madras Presidency, but the case I describe below is one of *Rhinosporidium kinealyi* infection of the pharynx in a Mohamedan female. Perhaps this is the first case of infection in a female ever published.

In 1906 Beatty published a detailed description of the microscopical appearance of the sporozoon. Kirpatrick and Ingram in Madras discovered the parasite in the eyelids of males. Elliot, Kirpatrick and Ingram—all these three—saw only five cases. It was in 1909 that Kirpatrick noted the condition and he described a case in which the lachrymal sac was infected with this sporozoon. Lieut.-Col. R. E. Wright, I.M.S., of Madras also described a case of lachrymal sac infection by this parasite. Dr. Thirimurthi of Madras recorded very valuable information on the parasite in 1914. Under the auspices of the Indian Science Congress, 1922, Wright and Thirimurthi read a very valuable paper on *Rhinosporidium kinealyi* infection and hitherto no case of pharyngeal affection by this sporozoon has been found recorded in a female in the Madras Presidency. Dr. Chinnaswamy Pillai of Madras saw in one case a papillomatous growth of the uvula. Col. Wright wrote about treatment with antimony in rhinosporidium infections of the conjunctiva.

My second case was an infection in the upper eyelid of a Mohamedan male and it was removed by clean excision and undercutting the pedicle of the tumour. From observations I am led to believe that the incidence of the disease is greatest in Mohamedans or Moplahs of the west coast of India. The lachrymal sac infection described by Col. Wright was also in a Moplah of the west coast. I hope to find more cases in Moplahs of this locality. I am contemplating a rhinosporidial survey of this circle when I hope to add more data with regard to its incidence. The customs, ways, manners and sanitary conditions of the Moplahs play rather an important rôle in the ætiology of this obscure disease. Its transmission problem cannot be tackled with these few cases for statistics. However, dust, water and contact with animals must have something to do with its transmission to man. A local predilection of the mucous membrane is also, in my opinion, essential for the parasite to form the nucleus of the growth. No other persons in the same house were infected during a period of close contact (with this patient—Case 1, *see* below) of eight years and as such I am led to believe that the parasite has an extra-corporeal cycle. Direct transmission was not possible in the pharyngeal case (Case 1), as the husband of the patient did not contract it during the last eight years of close contact. So an intermediary host is possible. With regard to age, children are more frequently infected than adults, probably due to want of proper cleanliness. In the Civil Orphan Asylum, Col. Wright saw all his cases in boys. The predilection to infection in the nose especially shows that dust which is commonly deposited in the nasal mucosa has got something to do with the infection. The infection is by mechanical transmission.

Nature of the growth generally.

The growths are soft, vascular, polypoid, papillomatous, reddish, friable, and bleed readily. They are attached to the mucous surface by a narrow pedicle or root. The root may be flattened or the growth may also be flattened if it occurs in the eyes, in which case it may look like small portions of lung tissue. The surface of the growth is generally granular.

Case 1. Rhinosporidium kinealyi *infection of the pharynx in a female.*—A Mohamedan female, K., aged 24, residing in Taliparamba bazaar came to me on 15th November, 1930, for a throat complaint. Irritable cough, discomfort, and occasional epistaxis. Duration—eight years. The tumour was as she reported very small in the beginning. She has a nasal resonance while talking but no growth in the nose. The tonsils were found normal. No lymphoid growth in the pharynx.

*In 1892 Prof. Malbran of Buenos Ayres received a specimen of a nasal polypus from a doctor in private practice, and on cutting sections of it discovered what he believed to be infection with a sporozoal parasite. He did not publish his finding, however. In 1896 Seeber of Buenos Ayres received similar material, and made the infection the subject of an M.D. thesis in 1900. His material was studied by Belou in 1903, who named the parasite *Coccidium seeberi* Wernicke, 1900.

Col. O'Kinealy's discovery of the infection in Calcutta was in 1894. His first paper on the subject, however, was read before the Laryngological Society of London in December 1903. Minchin and Fantham studied his material and published a paper on the subject in 1905, naming the parasite *Rhinosporidium kinealyi*. Belou's name in 1903, however, has undoubted priority, and the correct name is *Rhinosporidium seeberi* (Wernicke, 1900).

The classical monograph on the disease, which showed that the parasite is a fungus, is that by Ashworth (1923)—*Trans. Roy. Soc. Edin.*, LIII, 301.—(EDITOR, *I. M. G.*)

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On careful examination in good light, the growth was found springing from the nasopharynx. It was enucleated and there was bleeding which was arrested with adrenalin.

the lids were in apposition during the closure of the eye. The growth was removed by excision and undercutting the pedicle and the bleeding was arrested with alum eyewash and adrenalin.

DIAGRAM REPRESENTING CASE 1.
(*Rhinosporidium kinealyi* of the pharynx in a female.)

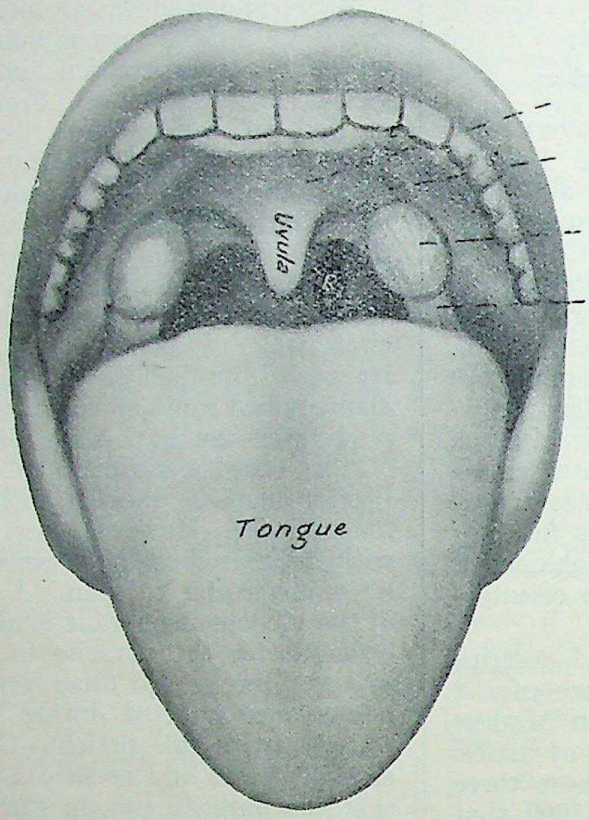

Fig. 1.—Anterior view.
R = *Rhinosporidium kinealyi* (*seeberi*).

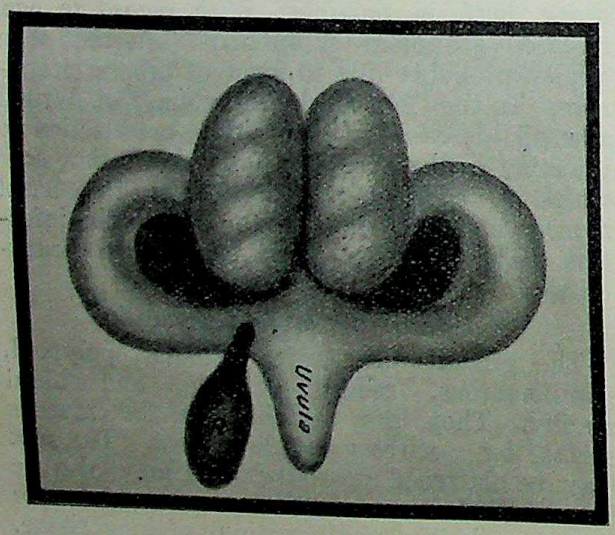

Fig. 2.—Posterior view.
R = *Rhinosporidium kinealyi* (*seeberi*).

Case 2. Rhinosporidium kinealyi *in the upper eyelid of a male.*—A Mohamedan boy, aged 12, came to me with a growth of the right upper eyelid on 17th December, 1930. Duration—two years. The growth was springing from the palpebral conjunctiva. There was a clear pedicle. The growth looked like a piece of lung tissue and was accommodated betwixt the eyelids when

Both the patients are now well and I do not expect a recurrence. Both cases showed bleeding greater than of ordinary nature, after the removal of the growths.

Both the specimens were duly sent to Lieut.-Col. R. Knowles, I.M.S., Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, where they were identified on section as growths due to *Rhinosporidium kinealyi* (*seeberi*).

My thanks are due to Col. Knowles for his opinion and identification of both the growths—the pharyngeal tumour in the female patient and the tumour of the eyelid in a Mohamedan male.

Treatment in Rhinosporidium kinealyi *tumours.*

Excision by undercutting the pedicle wherever possible is in my opinion very satisfactory. In the eyelids it is good and possible. In the pharynx too it holds good. But the method is not very satisfactory in nose cases. For small growths of the eyelids medicinal treatment other than operative can be tried. Col. Wright advocated the use of antimony solutions for dropping into the eye in eye infections. Kirpatrick used quinine solutions. Wright used quinine bi-hydrochloride solutions also. Unless diagnosis is made early, medicinal treatment may not be a success in all cases. When the growth has assumed a very noticeable size,

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what is best is operative procedure and it is satisfactory.

Operation by ligature and excision.

It is well known that rhinosporidial tumours bleed very readily and attempts to hold the tumours with instruments may tear the growth, resulting in bleeding and subsequent difficulties in its extirpation. So I have devised a "ligature and excision method" for this class of growths, the method being more suitable in affections of the pharynx and eyelid cases. The tumour is at first ligated with a horse hair as far below as its pedicle, and gentle and sufficient traction employed by pulling the ends of the ligature; and excision of the root completed as usual. By this manœuvre the growth comes away very nicely with the ligature after excision, and the method is essentially more adoptable in rhinosporidiosis of the pharynx and rhinosporidiosis of the conjunctivæ. By this ligature method the tumour after excision comes away like a fish on a fish-hook and is removed cleanly. The bleeding can be easily controlled by styptics, preferably adrenalin. The ligature method gives a nice traction, gives a vivid view of the pedicle and the growth is not damaged and causes no bleeding while dealing with the tumour and no sooner is the excision performed than the ligature with traction acts as a tractor and takes the growth away from the field of operation more readily. For specimens which are to be preserved for sectioning this method is an admirable one and pathological investigation on these tumours will be relatively easy. It is left to different operators to find out a suitable method so as to suit their necessities, and the method of "ligature and excision" is not a new operation, but I should like to state that this is a more convenient method and one that can be employed in delicate rhinosporidial tumours which are to be preserved as curios. Further the method is more elegant and comfortable to patients, and the traction by ligature enables the undercutting of the pedicle to be performed readily.

Conclusions.

1. *Rhinosporidium kinealyi* infection occurs in females in the Madras Presidency.
2. It occurs in the Moplahs of the west coast of India.
3. Rhinosporidium infection of the pharynx occurs in females.
4. Rhinosporidium infection of the upper eyelid occurs in males in Taliparamba.
5. Direct transmission from man to man is apparently unlikely.
6. An intermediary host may be required.
7. Dust and water can play an important part in the ætiology.
8. Insanitary conditions and close contact with animals may be a contributory factor.
9. Treatment by "ligature and excision" is the best method in dealing with the growth due to Rhinosporidium infection.
10. A local predilection of the mucous membrane is also a contributory factor in rhinosporidial infections.

DIAGRAM REPRESENTING CASE 2.
(*Rhinosporidium kinealyi* of the upper eyelid in a Mohamedan male.)

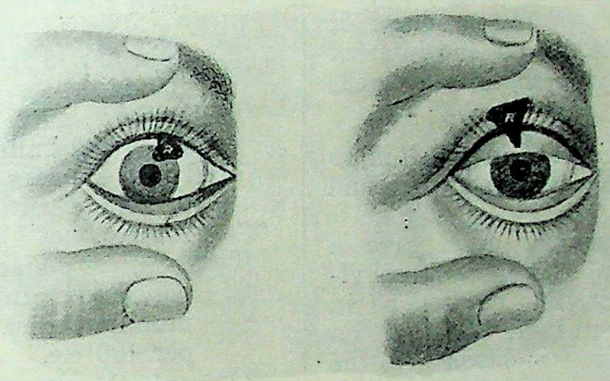

Fig. 3.—Lid lifted up and the tumour hanging.

Fig. 4.—Lid everted and the growth drawn upwards. (The shading of the lid is to show that it is the under surface.)

R = *Rhinosporidium kinealyi* (*seeberi*).

UROBILINURIA AND ITS IMPORTANCE IN MALARIA.

By JAMIAT SINGH, M.D., D.P.H., M.R.C.P. (Edin.),
Department of Physiology, King Edward Medical College, Lahore.

UROBILIN is a derivative of bilirubin. Bilirubin, formed from hæmoglobin by the cells of

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the reticulo-endothelial system, is in the large intestine converted by micro-organisms into stercobilinogen or stercobilin. Some of this pigment is reabsorbed into the circulation, taken to the liver to complete the cycle of bilirubin, or if it be in excess and the liver is unable to deal with it, it is passed out of the kidneys as urobilinogen.

Urobilinogen is a non-threshold substance and is passed out through the kidneys in whatever concentration it may be present. In health, urobilinogen is found in the urine in small amounts only and may roughly be said to be present to the extent of 10-500 units per 100 c.c. urine.

Excess of urobilinogen may be due to:—

(*a*) Excessive formation of bilirubin by cells of the reticulo-endothelial system on account of

(1) Excessive red cell destruction, as in acute malaria.

(2) Excessive hæmolysis, as in pernicious anæmia or poisoning by drugs, etc.

(3) Excessive absorption of the products of blood disintegration, as in internal hæmorrhage anywhere, or in lobar pneumonia.

Causes under head (2) are rare in the Punjab and can be diagnosed easily by the history and clinical examination.

Some of the lobar pneumonia cases gave a characteristic pink colour with paradimethylaminobenzaldehyde reagent, but not red as in acute malaria. Cases where there is absorption of the disintegration products of blood give the red colour of acute malaria with paradimethylaminobenzaldehyde reagent, but their diagnosis can be made by history and clinical examination.

(*b*) The second organ concerned in the urobilin cycle is the liver. In this connection it may be mentioned that excessive enlargement of the liver in 2 cases and atrophic cirrhosis of the liver with ascites in 4 cases were not accompanied by urobilinogen beyond the normal amount. In one case of chronic cholecystitis, urobilin was present in excessive amount, but quantitative estimation was not done.

(*c*) The third organ concerned in the urobilin cycle is the large intestine and thus it might be expected that chronic constipation will produce an excess of urobilin in urine. In 12 cases of chronic constipation, however, 20–40 units only of urobilin per 100 c.c. of urine were present.

Samples of urine of 90 indoor cases of the medical wards of the Amritsar Medical School were examined to ascertain the type of cases in general practice in which urobilin in large amount is present. These cases were of all the common diseases met with such as malaria, typhoid fever, pulmonary tuberculosis, cholecystitis, acute gastritis, diarrhœa, peripheral neuritis, bronchial asthma, chronic bronchiectasis, chronic peritonitis, emphysema, epilepsy, chronic constipation, chronic dysentery, pyrexias of uncertain origin, chorea, auricular flutter, aortic stenosis, subacute parenchymatous nephritis, cerebral hæmorrhage, ascites, diabetes, lobar pneumonia, etc.

There were 7 cases of lobar pneumonia, 6 of pulmonary tuberculosis and 3 of atrophic cirrhosis of the liver. Out of all these cases, the urobilin test was strongly positive only in those of acute malarial fever, lobar pneumonia (resolution stage), chronic cholecystitis and cerebral hæmorrhage.

An attempt was made by quantitative estimation of the urobilin in 150 cases by the method of Robert Elman, M.D., and Philip MacMaster, M.D., to fix some arbitrary standard by which one could distinguish cases of functional liver incapacity from those of acute malaria and lobar pneumonia.

The result was as under:—

Twelve cases of acute malaria; urobilin varied from 8,000 to 30,000 units per 100 c.c.

Fifteen cases of acute lobar pneumonia; urobilin varied from 4,000 to 8,000 units per 100 c.c.

Ten healthy individuals; urobilin varied from 10 to 500 units.

Thirty-seven cases of pulmonary tuberculosis; urobilin varied from 10 to 300 units per 100 c.c.

Two cases of pulmonary tuberculosis in which Sanocrysin injections had been given; urobilin varied from 1,200 to 2,000 units per 100 c.c.

One case of pulmonary tuberculosis with blood tinged pleural effusion; urobilin varied from 1,600 to 1,800 units per 100 c.c.

Five enteric cases; urobilin varied from 10 to 200 units per 100 c.c.

Two healthy individuals, urobilin was estimated before and after giving 20 grs. of quinine bisulphate by mouth; urobilin was the same on both occasions, 10 to 2,000 units per 100 c.c.

In 66 other indoor patients of the East Medical Ward, Mayo Hospital, the urobilin did not range more than 10–500 units per 100 c.c. Such patients suffered from pyrexias of uncertain origin, influenza, heart failure with kidney disease, chronic nephritis, ankylostomiasis, abscess of the lung, cerebrospinal syphilis, double aortic disease, pleurisy with effusion, parietal tumour, empyema, etc.

In all cases where more than 500 units of urobilin per 100 c.c. of urine were present, estimation was done from a 24 hours' specimen.

It will be seen from the quantitative estimations done that it is only in cases of acute malaria that one gets the largest amount of urobilin, 8,000 to 30,000 units per 100 c.c. Next come cases of lobar pneumonia where very often the colour is pink with paradimethylaminobenzaldehyde, but not red. In these cases 4,000 to 8,000 units of urobilin per 100 c.c.

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of urine were present. Thus cases of lobar pneumonia can be distinguished from pleurisy with or without effusion because in the latter diseases the amount of urobilin is very little.

It will be interesting to note here a case of anæmia due to malaria in which all phases of benign tertian malaria parasites were present. The case was afebrile and urobilin was not present in abnormal amount.

A few of the interesting cases seen in which presence of urobilin proved very useful in diagnosis are given below:—

Case 1.—Patient suffering from continued fever for 8 days with pain and tenderness in the abdomen, enlarged spleen; diagnosed as a case of typhoid by one qualified doctor and as a case of malaria by another; urobilin was held to be the deciding factor, and a strongly positive urobilin test led me to diagnose it as a case of acute malaria. Quinine in proper doses brought the temperature to normal in one day.

Case 2.—A boy, aged 8 years, with pain in the abdomen, temperature 105—105.5°F., diagnosed as a case of malaria. Absence of urobilin, leucocyte count of 18,000 per c.mm. and 85 per cent. polymorphonuclear leucocytes led me to conclude that the case was possibly one of early deep seated apical pneumonia. The urine was again examined on the 4th day, when the urobilin test was strongly positive and thus the diagnosis of lobar pneumonia was made more certain. Physical signs previously negative, became more marked now and the case ended in recovery by crisis on the 9th day.

Case 3.—A patient admitted in an unconscious condition to hospital, developed hemiplegia on the 3rd day of admission; the urobilin test was strongly positive in urine, lumbar puncture showed hæmorrhagic cerebrospinal fluid. The diagnosis of cerebral hæmorrhage was confirmed (the urobilin test may have some value in distinguishing cases of cerebral hæmorrhage from cerebral thrombosis and embolism).

It is on the presence of a strongly positive urobilin test that much reliance can be placed, except in those cases of chronic malarial fever which are yielding to quinine and in which weakly positive results will also be of value.

The urobilin test, although not specific for malaria, gives very good presumptive evidence of the presence of malaria in strongly positive cases. You may fail to find malaria parasites, but urobilin is never absent in cases of acute malaria. The urobilin test is in some respects even better than the search for malaria parasites, particularly in those cases where quinine may have been given in ineffective doses. In such fever cases the urobilin test is still positive, although malaria parasites may be absent from the peripheral blood.

The following tests (as recommended by me in the July number of the *Indian Medical Gazette*, 1930) were made to detect the presence of urobilin in urine:—

1. To 5 c.c. of urine, add 5 drops of 3 per cent. paradimethylaminobenzaldehyde solution in 50 per cent. hydrochloric acid. A red or pink colour indicates a positive test.

2. To 5 c.c. of urine add 5 c.c. of a saturated solution of zinc acetate in absolute alcohol and filter; add a drop of Lugol's iodine solution (iodine gr. ii, potass. iodide gr. vi, distilled water 100 c.c.); filter through filter paper; a green fluorescence in the filtrate shows a positive test.

In some cases addition of an equal amount of zinc acetate solution to the filtrate may have to be made, before the green fluorescence develops. This test is more delicate than the paradimethylaminobenzaldehyde one.

The intensity of the red colour in test 1 and that of the green fluorescence in test 2 roughly indicate the degree of urobilinuria present.

For quantitative estimation take 10 c.c. of urine, add 1 drop of Lugol's iodine solution and 10 c.c. of saturated solution of zinc acetate in absolute alcohol; filter through a filter paper and compare with a standard solution of 1 milligram of Acriflavine in 30,000 c.c. of distilled water, representing 1 unit (equivalent to 1 mgm. of urobilin dissolved in 950 c.c. of the standard diluent). The comparison should be made in a Cole's comparator by using test tubes of equal size and bore, filled up with solutions of the standard fluid and zinc acetate filtrate to the same height. Comparison is best made in direct sunlight or in a dark room using a 200 candle power lamp. The fluorescence in the test tubes should be observed at right angles to the axis of light passing through the solution. The best way, therefore, to compare is to let the light fall right on the top of the liquid through the open end of the test tubes.

If the zinc acetate filtrate shows a stronger fluorescence than the standard, the filtrate should be diluted with the following diluting fluid:—

Sixty per cent. alcohol, 2,000 c.c.; zinc acetate, 50 gr.; concentrated hydrochloric acid, 2 c.c.; filtered repeatedly till perfectly clear.

In cases where the urine contains bile, it should be cleared from bile by taking 20 c.c. of urine, mixing with 20 c.c. of 20 per cent. ferric chloride solution in a beaker, adding 40 c.c. of 20 per cent. ammonia water immediately and filtering at once into a 50 c.c. graduated flask; when 25 c.c. of the fluid has been obtained, the remainder is discarded.

To 25 c.c. of the filtrate concentrated hydrochloric acid is added drop by drop till the solution is barely acid to litmus; about 1 grm. of dry zinc acetate is thrown in and the whole is made up to the 50 c.c. mark with saturated zinc acetate solution in 95 per cent. alcohol. The filtrate will show the green fluorescence.

The importance of the urobilin test cannot be exaggerated. This test gives very valuable information at the bedside of the patient in five minutes, such as few other clinical tests can give.

Summary.

1. A strongly positive urobilin test with 8,000 to 30,000 units per 100 c.c. of urine gives very strong presumptive evidence of the presence of malarial infection in any acute febrile condition.

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2. Weakly positive results may be of value in those cases of acute malaria which are yielding to proper doses of quinine.

3. The urobilin test (paradimethylaminobenzaldehyde) gives very often a pink colour in cases of lobar pneumonia, the urobilin units being 4,000 to 8,000 per 100 c.c. of urine, and this may distinguish this condition from other lung conditions.

4. The urobilin test may have some value in distinguishing cases of cerebral hæmorrhage from cerebral tumour, embolism or thrombosis.

My thanks are due to Major Amir Chand, Lieut.-Col. J. J. Harper Nelson and Lieut.-Col. T. A. Hughes for allowing me to examine the urine of the patients of their wards, and to Major H. S. Anand for encouragement to carry out the tests.

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RECENT ADVANCES IN INFANT FEEDING.

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TRUBY KING's theory is that the vast majority of full term babies are born healthy and that they become weakly and unhealthy largely owing to the well-meaning but misguided efforts of the parents and attendants. His great success in reducing infantile mortality in New Zealand to the lowest in the world proves the truth of his hypothesis. Curiously enough he has written nothing for the profession and not very much for the laity; it is still more surprising that he was originally not a pediatrician but a specialist in mental diseases before he became interested in infantile mortality and began his propaganda.

Much remains to be done in interesting practitioners in the subject as they receive little or no training in it. The writer was examining candidates in midwifery for the Calcutta M.B. degree some little time ago, and fears that he created alarm and despondency in the oral portion of the examination by asking. "How would you feed a week-old baby, the mother having died and a foster mother not being available?" The answers showed amazing ignorance. They varied from "Hourly feeds of half a drachm of milk and half a drachm of water" to "Three-hourly feeds of three ounces of 20 per cent. cream"! As these gentlemen are the future practitioners of Bengal, it occurred to the writer that a summary of the recent work on infant feeding might be of assistance.

(1) *Breast feeding.*

This is the food intended by nature for the baby and no other food or preparation whatsoever can approach its suitability. Its composition may be taken in round figures to be:—

	per cent.
Protein	2
Fat	4
Carbohydrate	6.5
Salts	0.2
Water	87.3

(*i*) How often is the baby to be fed?

The full term baby should have either three-hourly or four-hourly feeds. The former means that he should get his feeds at 6 a.m., 9 a.m., 12 noon, 3 p.m., 6 p.m., 9 p.m. and a drink of water during the night if he wants it. This amounts to six feeds in the twenty-four hours. Four-hourly feeds are given at 6 a.m., 10 a.m., 2 p.m., 6 p.m., and 10 p.m., amounting to five feeds in the twenty-four hours. It is a matter of dispute which system is better. Many babies thrive on four-hourly feeds and this arrangement is also more convenient for the mother. But as a considerable number of babies are unable to take the larger amount necessary in each of the four-hourly feeds, it is a good general rule to order three-hourly feeds until the baby is about 10 lbs. in weight. Whichever system is adopted, the mother should understand that the three (or four) hours are reckoned from the commencement and not from the end of the last feed.

(*ii*) Is the baby to have one or both breasts at each feed? It is a good general rule to let the baby have 7 to 10 minutes at each breast at every feed, beginning at alternate sides. This has the advantage of not giving the baby the last milk in the breast which is often too rich in fat. The disadvantage of it is that the best stimulus to the breast, which is complete emptying of it, is lost. Therefore, if there are signs of the supply beginning to fail, complete emptying should be carried out by the baby or by manipulation by the fingers or by the breast pump.

(*iii*) What are the infant's requirements of breast milk? He requires 2½ ozs. per lb. weight per day; e.g., an 8 lb. baby should get 20 ozs. per day. A simple practical method of knowing whether his needs are being fulfilled is by noting the following points:—

(*a*) his weight should increase by 5 or 6 ozs. per week after the first week for the first three months, and thereafter by about 4 ozs. per week for the next three months;

(*b*) he should be happy and contented and spend his life mostly in sleeping and feeding;

(*c*) the stools should be healthy and occur two or three times a day.

The only accurate method of ascertaining the amount of milk taken is by weighing the baby

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on a fine scales (registering down to ½ drs.)—not on a spring balance—before and after each feed for a whole day. Two precautions are necessary:—(*a*) the weighings must be done for each feed in the twenty-four hours because the amount of milk in the breasts varies at different times, being greatest at the 6 a.m. feed: (*b*) if he passes urine or has a stool after his "ante-feed" weighing and before his "post-feed" weighing, the napkin should not be changed until after the "post-feed" weighing has been done.

Difficulties in breast feeding are:—(*a*) under-feeding, (*b*) over-feeding, (*c*) air swallowing.

(*a*) *Underfeeding.*—This is the commonest, at any rate amongst European patients. A distracted mother will say that she does not know what to do with her baby because it cries all day and all night; very often she will add "and I know that I have plenty of milk because it is running from me." It is of course a great mistake to imagine that there is an ample supply of milk because some oozes from the nipple. The baby has not put on weight and he is constipated; he may even have diarrhœa from starvation. If such a baby is weighed, it will be found that he is under the normal weight and if weighings are carried out before and after each feed for a day, it will be obvious that the requirements of 2½ ozs. per lb. weight per day are not being supplied. These cases are dealt with by stimulating the breast and, if necessary, by complementary or supplementary feeds of cow's milk.

Stimulation of the breast is carried out as follows:—

(*i*) The mother should have plenty of fluids. It is a good plan to have a fixed rule about it, e.g., that she should drink half a tumbler of water each time she feeds the baby.

(*ii*) She should have plenty of good nourishing food, fresh air and sunshine.

(*iii*) Contrast baths should be applied to the breasts for ten minutes daily. Two basins are prepared, one full of water as hot as can be borne and the other full of iced water, with a double fold of lint in each. The hot and cold compresses are applied in turn for half a minute each to the breasts and this is continued for ten minutes.

(*iv*) The breasts should be massaged for ten minutes daily and should be completely emptied by manipulation with the fingers or the breast pump after each feed.

(*v*) She should take a cup of milk or Horlick's malted milk or Ovaltine during the day and at bed time.

(*vi*) She should be warned that worry is the worst enemy of the breast milk supply.

In favourable cases increased secretion of milk will manifest itself and all will be well. In others, however, the amount remains below requirements. Additional food has to be provided by complementary or supplementary feeds of cow's milk. The former are given after one or more breast feeds to bring them up to the required amount; the latter are given in place of an entire breast feed (or more than one). Supplementary feeds are very likely to be followed by gradual drying up of the breast milk because of the loss of the regular stimulus of emptying the breast. Complementary feeds are therefore better, but care must be taken not to overfeed the baby since the mother cannot know how much has been obtained from the breast. For directions for these feeds see under "Artificial feeds of modified cow's milk."

(*b*) *Overfeeding.*—This is shown by the baby vomiting or rather regurgitating milk after its feeds, by an excessive increase in its weekly weights—say 8 ozs. or more—and often by frequent stools. It is corrected by seeing that the baby is fed regularly—four-hourly feeds will probably suit best and by cutting down the length of time of each breast feed.

(*c*) *Air swallowing.*—All babies swallow some air in suckling and for this reason it is necessary that after a feed the baby should be placed erect against the attendant's shoulder for a few minutes to enable it to get rid of the bubble of air. Some babies swallow more than usual and are very likely to vomit in their efforts to get rid of it. It can be prevented by not allowing the baby to suck at an empty breast, by making him take his feeds slowly, and by holding him erect against the shoulder in the middle and at the end of each feed.

Note:—No baby should be removed from its natural feeds—the breast—except for the gravest reasons, e.g., tuberculosis of the lungs in the mother.

(2) *Artificial feeds of modified cow's milk.*

Cow's milk differs from human milk in several respects.

(*i*) The quantities in its composition and in human milk are shown in the following table:—

	Human milk. Per cent.	Cow's milk. Per cent.
Protein	2.0	4.0
Fats	4.0	4.0
Carbohydrates	6.5	4.5
Salts	0.2	0.6
Water	87.3	86.9

(*ii*) There are further differences in the quality of all of these items except in the carbohydrates and of course the water.

(*a*) *Protein.*—The protein of human milk consists of two-thirds of soluble protein (lactalbumin and lactglobulin) and one-third of insoluble protein (caseinogen). Cow's milk protein consists of only one-fifth of soluble protein and four-fifths of insoluble protein. It is to be remembered that it is the insoluble protein which is likely to upset the baby's digestion. If we reduce by dilution the total of protein from 4 per cent. to 2 per cent., we still have to deal with the large proportion of caseinogen and in certain difficult cases no

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amount of diluting or "humanising" will be of use.

(*b*) *Fat.*—In human milk it is in a finer state of subdivision; the globules are therefore smaller and more easily digested. Cow's milk also contains more tripalmitin and less of the easily digested triolein than breast milk.

(*c*) The carbohydrate is the same in both—lactose, but cow's milk contains only about two-thirds of the amount present in human milk; this is still further reduced by the dilution necessary on account of the excess of protein in the former.

(*d*) *Salts.*—Cow's milk contains only about one-tenth of the amount of iron present in human milk; it contains five times as much calcium and much more sodium and potassium salts. The significance of these facts is:—

The deficiency in iron, which is exaggerated by dilution, leads to anæmia in bottle-fed babies. (*Proc. Roy. Soc. of Med.*, Mackay, Nov. 1928.)

The high percentage of calcium along with the great excess of caseinogen produces large curds of calcium caseinate which is a common cause of digestive trouble.

The excess of calcium phosphate and calcium caseinate produce a high "buffer" effect in cow's milk. This means that these substances can absorb a considerable amount of hydrochloric acid without changing their reaction to litmus. The protein of cow's milk, therefore, requires a much higher percentage of hydrochloric acid before the pepsin can act on it than does the protein of human milk. This tends to produce a condition of hyperchlorhydria in infancy which, it has been suggested, may lead to digestive troubles in adult life (Pritchard).

Two other factors have to be considered, namely the bacterial content and the vitamine content. Milk swarms with bacteria and is the purveyor of bovine tuberculosis in every country; in India there is the added danger of its carrying the germs of the typhoid group, dysentery, cholera, etc. It must be boiled. Human milk is practically sterile.

There are three vitamines in milk—A, C, and D. Vitamine C is destroyed by boiling, but can be easily replaced by giving the baby fresh fruit juice—orange, tomato or grape—1 or 2 drachms in an ounce or so of water daily. The amounts of vitamines A and D in the milk depend on the diet of the cow and also on the amount of sunlight to which the cow has been exposed. It has been found that the milk of cows which have been kept indoors during the winter ("stall fed") contains much less than of those which have been fed on pasture in the sunlight of summer. Consequently these elements must be almost entirely absent from the milk of the miserable cows that one sees stabled in the dark basements of north Calcutta.

As the milk has to be diluted, the vitamine content is greatly reduced; it is therefore necessary to administer cod-liver oil. Crook's 50 per cent. emulsion is excellent for the purpose, half to one teaspoonful being given thrice daily in the milk. Truby King has devised a preparation of cod-liver oil which he calls New Zealand Cream. It consists of:—50 per cent. fat and oils (of which two-thirds is animal fat and one-third is vegetable oil; 75 per cent. of the animal fat is butter fat and cod-liver oil), 40 per cent. sugars and 10 per cent. water. The dose is one drachm per day gradually increasing up to one ounce per day. It is not readily obtainable in India but can be obtained from the Mothercraft Training Society, Cromwell House, Highgate, London, N.6. Personally, I am doubtful about its superiority over Crook's emulsion.

The last point to be noted about cow's milk, especially in the tropics, is that its composition depends on the cow and the degree of dishonesty possessed or acquired by the owner of the cow, the milkers, the person who delivers the milk and finally one's own servants. In this respect the dried milks possess an enormous advantage.

What are the baby's requirements of cow's milk?

There are two methods of estimating them:—by weight and by calorie estimation. The former is much simpler and for ordinary purposes is quite accurate enough. A baby needs $1\frac{1}{2}$ to $1\frac{3}{4}$ ounces of cow's milk per lb. weight per day and this must be diluted to bring the bulk up to $2\frac{1}{2}$ ozs. per lb. weight per day. An 8 lb. baby, therefore, requires 12 to 14 ozs. of milk a day and this has to be diluted to bring the total bulk up to 20 ozs. a day. The amount in each feed is calculated by dividing these figures by 6 if he is getting three-hourly feeds or by 5 if on four-hourly feeds. In addition he requires one level teaspoonful of lactose per lb. weight (up to 1 oz. a day) per day and also, on account of deficiency of fats in diluted milk, $\frac{1}{2}$ to 1 dr. of 50 per cent. cod-liver oil emulsion thrice daily (Paterson).

It will be observed that the proportion of 12 ozs. of milk to 8 ozs. of water in the example quoted above is stronger than is usually given and is indeed stronger than most babies can manage at first. It is therefore advised that equal parts of milk and water should be given for the first two months and that the strength should be cautiously increased after that age at the rate of one feed per day until the full amount is being taken.

The second method is to calculate the requirements in calories. A full term baby requires 40 to 45 calories per pound weight per day. (These are large calories.) An 8 lb. baby needs, therefore, 320 to 360 calories a day. The calorie value of the food-stuffs is as follows:—1 oz. milk = 20 calories; 1 dr. carbohydrate = 14 calories; 1 dr. protein = 14 calories; 1 dr. fat = 32 calories. The feed above described for an 8 lb. baby gives the following calorie equivalent:—10 ozs. milk = 200 calories;

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8 drs. lactose = 112 calories; 1 dr. of cod-liver oil = 32 calories; total = 342 calories.

Note:—It is advised that about one-third of the calories should be from the fat and one-half from the carbohydrates.

When estimating the requirements for a baby who is badly under weight for its age, one should calculate them (*a*) for its actual weight, and (*b*) for what its weight should be for its age: the mean between the two should be adopted at first.

Difficulties in feeding with cow's milk.

(1) *Protein dyspepsia.*—The insoluble protein (caseinogen) is the cause of this trouble. The symptoms are crying (due to colicky pains) and restlessness, with perhaps vomiting of curds, soon after a feed; constipation is very common. The stools are firm and lumpy, rubber-like in consistency, pale in colour, and tend to adhere to the napkin. The lumps are curds of calcium caseinate and are to be distinguished from the curds seen in fat dyspepsia which are soaps and are very greasy in appearance. The baby's weight remains stationary or he may lose weight. A popular remedy for this is to add 2 grs. of sodium citrate to each feed; it helps to prevent large curds from forming. In addition, barley water should be used to dilute the milk instead of plain water. If this is not successful, the milk should be boiled for five minutes; boiling modifies the casein curd and is the principle of Dennett's system of feeding. Another method is by the use of lactic acid milk. This is made by adding 45 minims of B. P. lactic acid, drop by drop, to a pint of milk, stirring all the time. It produces an extremely fine curd which will readily pass through a teat and has the added advantage that it lowers the buffer action of cow's milk. It is strongly recommended. Lastly in very obstinate cases the milk must be peptonised. Allenbury's Food No. 1 deserves honourable mention in these cases; it is a dried milk from which some casein has been removed and soluble albumin and cream added. It is most useful.

(2) *Fat dyspepsia.*—This is as likely to arise as protein dyspepsia and many authorities regard the fat element as the dangerous one. The early stages are described by the Germans under the term "milch-nahrschaden" or milk injury. It is characterised by constipation with palish formed greasy stools which do not adhere to the napkin and tend to crumble. They consist largely of soaps. This is associated with failure to gain in weight. A more advanced stage is called fat dyspepsia in which there is vomiting of rancid curds ½ to 1 hour after a feed and colicky pains. A still more advanced stage is fat diarrhœa; the stools become frequent, sour-smelling, greenish yellow in colour and contain mucus and curds. These curds are soaps—the combination of fatty acids with calcium, sodium and potassium—and the depletion of the alkalies from the body leads to a relative acidosis. If this stage is neglected, the baby will pass either into a stage of acute gastro-enteritis or into a stage of chronic wasting included under the term marasmus.

Fat dyspepsia is corrected in the early stages by skimming* the milk; this removes most of the fat. The cod-liver oil should be omitted. If diarrhœa is present, Mellin's Food should be given instead of lactose as it is less easily fermented. In more advanced cases, the fat should be completely removed from the milk by converting it into whey by means of rennet; the whey can be given for a few days. In this connection, mention must be made of "Half Cream Cow and Gate Milk Food"; it is so excellent in these cases of fat dyspepsia that it is the routine diet for them in the Hospital for Sick Children, Great Ormond St., London. Unfortunately it is not easily obtainable in India.

(3) *Carbohydrate dyspepsia.*—This is called by the Germans "mehl-nahrschaden" or "farinaceous food injury." It manifests itself by frequent frothy stools which tend to excoriate the buttocks, restlessness and colicky pains. In this type of case lactose should be omitted and when improvement occurs, a carbohydrate which does not ferment so easily should be used. Mellin's Food which is a mixture of the polysaccharide, dextrin, with the disaccharide, maltose—(sometimes called dextri-maltose)—is one of the best. Protein milk is useful in these cases. The method of preparing it from the curd of whey and the clear portion of buttermilk is so complicated that it is simpler to buy it. It is on the market under the name of Meade's Protein Milk. The composition when mixed with the appropriate amount of water is:—protein 3 per cent., fat 2.5 per cent., lactose 1.5 per cent.

Underfeeding and overfeeding may, of course, also be met with. A typical example of the former is the following case about which the writer was consulted some time ago. The baby was three months old and the mother stated that it cried all day and all night. It weighed 7 lbs. at birth and had put on only 1 lb. since then. It was breast-fed for a week, after which as the supply failed it was put on three-hourly feeds of one ounce of milk and two ounces of water. Recently the doctor had increased the bulk to five ounces but had not altered the proportions. The baby was unable to finish the increased feeds and always left one ounce. Here was a case of starvation. In the three-ounce feeds, the baby was getting 1 oz. of milk, or 6 ozs. in 24 hours. In the increased feeds it was getting one and one-third ozs. of milk per feed or 8 ozs. in 24 hours. The requirements for its weight were 8 × 1½, i.e., 12 ozs. per day; for its age it should have been 13 lbs. weight and the needs for that were 13 × 1½ about 20 ozs.

* There are several ways of skimming milk. One of the simplest is to make it simmer in a shallow saucepan over a fire for ten to fifteen minutes and to keep removing the top milk all the time with a shallow spoon.

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per day. The mean between 12 and 20 ozs., i.e., 16 ozs. per day, that is two and two-third ounces of milk each feed, was the requisite amount. By gradually increasing at the rate of one feed a day, the baby began to put on weight at 6 ozs. per week.

(3) *The dried milks.*

These are prepared from cow's milk by rapid evaporation of the water content. Typical examples are Glaxo and Cow and Gate (full cream) Milk Foods. They possess certain advantages over fresh cow's milk. They are sterile and of uniform composition; the casein is rendered more easily digestible by the drying process; they keep fresh in sealed tins and are extremely useful in travelling. The disadvantages are a slight loss in vitamine content, increased expense and the injudicious directions on the tin.

The loss in vitamine content is of small importance and is not more than in boiled milk —mainly vitamine C. It is made up for by the use of fresh fruit juice as explained before. Expense is a serious factor except for the well-to-do.

If the directions on the tin are followed, i.e., to dissolve one level measure of the dried milk in one ounce of water, the result will be a milk of the same strength as undiluted cow's milk. This tends to result in overfeeding and an over-fat flabby baby or perhaps an attack of gastro-enteritis. It is only fair to say that many babies do not appear to suffer any inconvenience. Care should be taken to use these dried milks intelligently and to dilute them as one has to dilute fresh milk; that is to say $1\frac{1}{2}$ to $1\frac{3}{4}$ measures should be dissolved in $2\frac{1}{2}$ ozs. of water and this amount should be given for each lb. weight of the baby, lactose being added in the proportion of one level teaspoonful per lb. weight as with fresh milk. Cod-liver oil should also be given as directed under fresh milk. These remarks do not apply to "humanised" dried milks of which Allenbury's No. 1 Milk Food is an example.

The reference to the anæmia of bottle-fed babies would be incomplete without a short note on the subject. The anæmia does not begin to manifest itself for some months as the newborn baby has an ample store of iron in its liver. Mackay recommends that after the age of two months, small doses of ferri et ammonii citras be given, increasing gradually until 2 grs. three times a day are being given. After the age of nine months, the deficiency in iron is made up from half the yolk of an egg, gradually increased to the whole yolk, and later on from cabbage or spinach.

I should like to add a few words on the subject of the thoughtless cruelty of the perambulator. Many unthinking mothers, nurses and *ayahs* could write a prescription for giving a baby heat-stroke. It would be as follows:— "Sink the baby as deeply as possible into the perambulator so that any little breeze which might happen to blow is shut off from him. Place the perambulator on a sunny verandah or compound; raise the leather hood 'to protect his head from the sun' (thus effectively shutting off any possibility of ventilation about the head); in a few moments the leather hood will have become so hot that one can scarcely touch it and the air around the baby's face will be nearly as hot; then wait. If this is not successful add a few more blankets over the baby!"

The use of the leather hood except to keep off rain should be made a criminal offence. If it is desired to protect the baby from a strong sun, a canopy which is freely open at the sides should be used. It is best to allow the baby to be in the shade of a building with the sky over him; in this way he gets the benefit of the ultra-violet rays. A hood shuts them off.

Acknowledgments are made to the following works:—

Modern Methods in Infant Feeding—Donald Paterson.

Diseases of Children—Garrod, Batten, Thursfield and Paterson.

Infant Nutrition—Tallerman and Hamilton.

Clinical Observations on Infant Feeding and Nutrition—Gladstone.

THE SANITARY SIGNIFICANCE OF THE PRESENCE OF *PS. PYOCYANEA* IN WATER SUPPLIES.

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Ps. pyocyanea, which belongs to the Pseudomonas group of organisms, has in common with the other members of this group a wide distribution in nature, being commonly found in soil, sewage and water. It however differs from the others in that it is pathogenic for man.

Ps. pyocyanea is an organism which is usually associated with abscesses and suppurative wounds, giving rise to a bluish green pus. It may also invade the nasal fossæ, middle ear, meninges, etc., and set up an inflammation. It has been the apparent cause of fatal septicæmias in man, and in infants and young children sets up intestinal disturbances. According to Pons it is especially pathogenic in the tropics. It is responsible for typhoid-like infections and for abscess of the liver, and has been implicated in a dysentery-like outbreak which was water-borne. Sir Patrick Manson—in the 5th edition of his book on tropical diseases—describes *Ps. pyocyanea* as one of the causes of bacillary dysentery.

It will be seen that this organism, in addition to being found in suppurative conditions, is also directly associated with diseases of the gastro-intestinal tract such as gastro-enteritis, typhoid and dysentery-like conditions.

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This infection of the gastro-intestinal tract naturally leads one to consider the channel by which the infection is spread, and as food and water play a very important rôle as vehicles for the spread of these gastro-intestinal affections the importance from a sanitary point of view of the existence of this organism in water supplies is quite recognisable. There exists, however, a good deal of controversy on this point, some workers dismissing the finding of this organism in water supplies as of very little importance, and others again laying a great deal of stress on the importance of this finding when giving an opinion on the quality of a sample of water.

Adams in his review of a pyocyaneus-like organism found in water is of opinion that though its presence is not desirable, there is considerable doubt as to its pathogenicity.

Jordon states "on the whole there is no doubt that under certain conditions *Ps. pyocyanea* is pathogenic, even gravely so, for man."

Ps. pyocyanea is a small, slender, actively motile, non-sporing bacillus, possessing a single flagellum placed at one end; it stains easily with all the usual dyes and is decolorised by Gram's method.

Culturally it is aerobic and grows readily upon the usual laboratory media. On agar slopes the growth is abundant, the pigment becoming visible after about 18 hours, soon penetrating the agar itself and becoming diffused throughout it.

In broth a rapid growth takes place, chiefly at the surface where the pigment is formed.

The pigment of this organism, pyocyanin as it is called, has been the subject of much investigation and is soluble in chloroform. *Ps. pyocyanea* also produces a water-soluble pigment which is common to other fluorescent bacteria.

It will be seen therefore that on account of the ability of *Ps. pyocyanea* to grow readily and rapidly on ordinary media and also to this characteristic being extended to MacConkey's media, both agar and broth, the isolation of this organism from water, unlike that of typhoid and dysentery bacilli which require special media and technique and which even then is attended with unsuccessful results, is easily carried out and the water analyst is able to study:

1. The sources of water which most frequently harbour this organism.
2. The organisms with which *Ps. pyocyanea* is associated in water.
3. The influence of sunlight on its existence in water.
4. The quality of the water as judged by the presence of other intestinal organisms.
5. The significance to be attached to the finding of this organism in water.

1. *Sources of water harbouring this organism.*

The writer when doing some work on the bacteriology of tube well water was struck by the number of occasions on which *Ps. pyocyanea* was found, and since then, when examining samples of water sent to the laboratory and also samples collected for purposes of research, has noted the sources showing the presence of this organism. These comprise tube wells, shallow wells, lakes and pipe water. From this it will be seen that various sources, irrespective of whether they are considered good or bad, are capable of harbouring this organism.

One of the sources, a small collection of rain water, regularly showed the presence of *Ps. pyocyanea* during the monsoon months, and proved very useful later when the effect of sunlight on this organism was studied.

2. *The organisms with which* Ps. pyocyanea *is associated in water.*

In dealing with this point it must be remembered that *Ps. pyocyanea* grows readily and rapidly in ordinary media and in MacConkey's broth and according to Greer and F. V. Nyhan is likely to overgrow other organisms that may be present. They observe that *B. coli* is frequently overgrown by *Ps. pyocyanea*, so much so that in 48 hours attempts to isolate *B. coli* will usually fail.

On more than one occasion a MacConkey's agar plate, sown from the lactose broth tube showing the presence of lactose-fermenting organisms, showed a heavy, and in some instances almost a pure growth of *Ps. pyocyanea*. It is necessary however to remark that when subculturing from a broth culture, the loop, irrespective of the depth to which it may be inserted, must when being withdrawn come in contact with the surface growing organisms and will convey them to the fresh media. *Ps. pyocyanea* is characterised culturally by its rapid growth and like *V. choleræ* for its surface growth, so that whatever the variety of organisms contained in the lactose broth culture, there is at the surface a heavy growth of *Ps. pyocyanea* with which the loop comes in contact and a preponderance of colonies of this organism when a subculture is made on to an agar plate is to be expected.

It was found that by pouring off the upper third of the mixed culture contained in the tube and subculturing from the residue a heavy growth of lactose-fermenting colonies could be obtained and further examined.

During the past year *Ps. pyocyanea* was isolated from samples of water on 13 different occasions and lactose-fermenting organisms associated with it were on each occasion further examined with a view to determining their capability or otherwise of utilising citrate, and if in the latter category their identification.

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The 13 samples so examined contained organisms incapable of utilising citrate and were identified as follows:—

1.	*B. coli communis* *B. neapolitanus*	8.	*B. neapolitanus*
2.	*B. coli communis*	9.	*B. neapolitanus*
3.	*B. neapolitanus*	10.	*B. acidi lactici* *B.* 100 *B.* 67
4.	*B. coli communis* *B. neapolitanus*		
5.	*B. neapolitanus*	11.	*B. coli communis*
6.	*B. coli communis* *B. neapolitanus* *B. acidi lactici*	12.	*B. neapolitanus*
7.	*B. neapolitanus*	13.	*B. neapolitanus*

All the above organisms, it will be observed, are of intestinal origin.

3. *The influence of sunlight on its existence in water.*

The influence of sunlight was observed throughout the wet and dry season of the year.

When carrying out examinations of the collections of rain water already referred to, it was noticed that within 14 days of the cessation of the monsoon *Ps. pyocyanea*, which previously had been regularly isolated, was now conspicuous by its absence and three further attempts to isolate it within the following 10 days proved unsuccessful.

Ps. pyocyanea, with which this water was heavily infected, had been killed and the lethal effect of sunlight was the only factor to which one could attribute the disappearance of this organism.

To confirm the above finding three agar plate cultures containing isolated colonies of *Ps. pyocyanea*, *V. choleræ* and *B. coli communis* were exposed to direct sunlight for a period of 6 hours at a temperature ranging between 100° and 110°F. Cultures into broth made hourly of 4 colonies from each plate showed that *Ps. pyocyanea* and *V. choleræ* were killed within two hours, whereas a growth of *B. coli communis* was obtained after six hours exposure.

4. *The quality of the water as judged by the presence of other intestinal organisms.*

A very interesting point noticed while carrying out these examinations was that lactose-fermenting organisms of undesirable origin were found on 12 of the 13 occasions in one c.c. of the sample of water examined and as such these samples would be regarded as of a poor standard of bacteriological purity.

5. *Lastly the significance to be placed on the finding of* Ps. pyocyanea *in water supplies.*

1. Greer, Tonney and Nyhan state "*Ps. pyocyanea* may or may not be pathogenic when ingested, but its presence in water should not be ignored. In our experience it is usually associated with *B. coli*. This fact combined with its potential infective properties should condemn a water from which it is isolated."

2. The results of the 13 complete examinations of the water containing *Ps. pyocyanea* show that it was found in association with *B. coli* and *B. neapolitanus* in 12 of the 13 occasions and the presence of the two latter organisms was detected in each instance in 1 c.c. of water. The presence of *B. coli* being the accepted index of pollution it will be seen that these samples of water, without the detection of *Ps. pyocyanea*, would from a bacteriological point of view be condemned.

3. Though the water analyst may not feel justified in condemning a water on the finding of *Ps. pyocyanea* alone, the presence of this organism will serve, one might say, as a danger signal since its presence is detected early in the examination, being frequently found after 24 hours on the agar plate used for the total count.

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Greer and Nyhan (1928). *Journal of Infectious Diseases*, Vol. XLII, No. 6, p. 525.
Greer, Tonney and Nyhan (1928). *Journal of Infectious Diseases*, Vol. XLII, No. 6, p. 537.
Jordon (1928). *General Bacteriology*, p. 473.

SOME MODERN ADVANCES IN RADIOLOGICAL DIAGNOSIS.*

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RADIOLOGY is the baby of medical science but it is a robust and rapidly growing child. Like Gargantua it had a late conception, and if its present rate of growth is any indication it will soon assume Gargantuan proportions.

I do not propose in this paper to give, by any means, all the advances which have taken place in radiological diagnosis during the past few years, but to confine myself to a few.

1. *Radiology of the gall bladder.*

Until some six years ago we had to give an opinion on the gall bladder from an ordinary radiogram. Unfortunately the average gall-stone, being composed of bilirubin or cholesterin, is completely translucent to *X*-rays. It was only in the case of the 5 per cent. or so of gall bladder calculi, that were coated with calcium salts, that a positive diagnosis could be made. In certain cases one could draw deductions from the presence of a gall bladder shadow, resulting either from a much thickened wall or a large collection of translucent stones, or relatively opaque material. Again, Arial George has shown that in many cases a pathological gall bladder makes an impression of a "half shadow" type on the barium-filled duodenal

*Being a paper read at the Medical and Veterinary Section of the Indian Science Congress held at Nagpur in January 1931.

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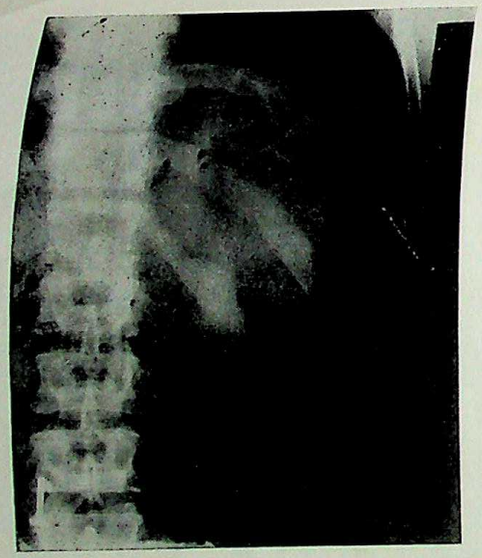


Fig. 1.—Cholecystogram of a normal gall bladder 15 hours after the oral administration of the dye.

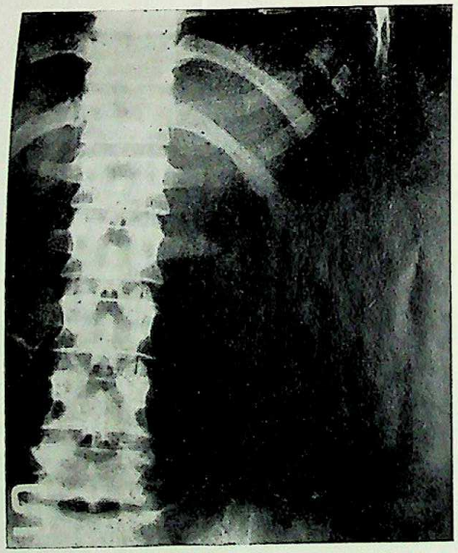


Fig. 2.—Single large laminated calculus in the gall bladder.

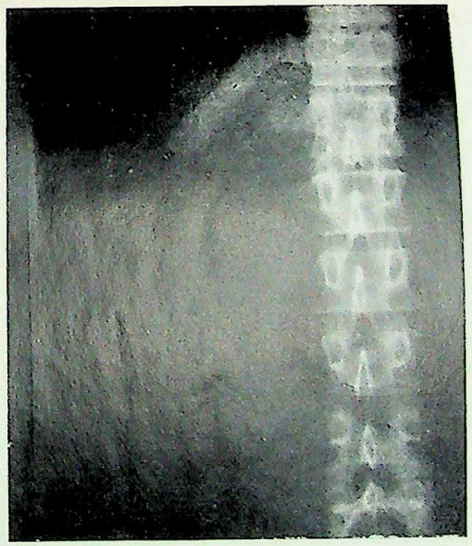


Fig. 3.—Single calculus in the gall bladder. Note the thin coating of opaque calcium salts.

Fig. 4.—Cholecystogram showing the dye around non-opaque calculi.

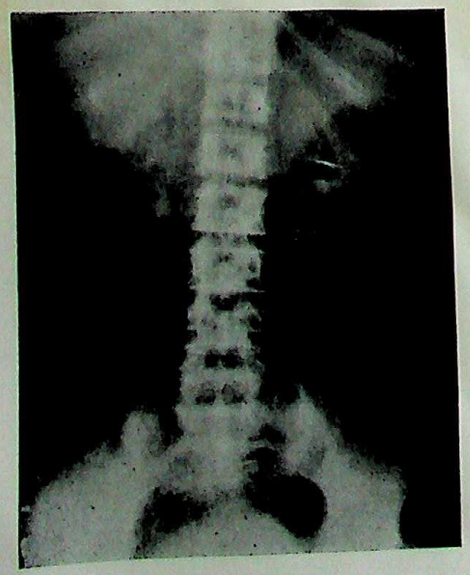
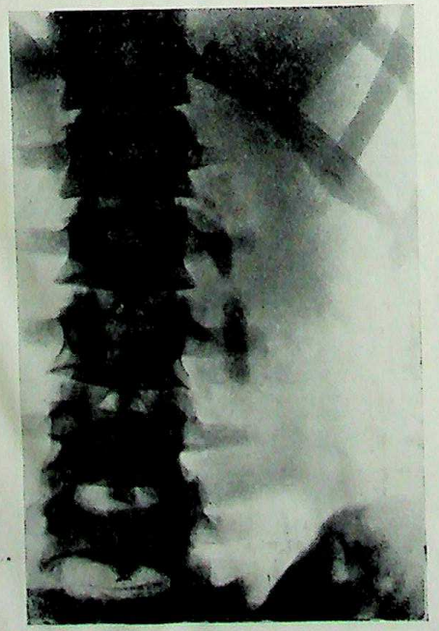


Fig. 5.—Same as Fig. 4. Another case.



Figs. 6 and 7.—Mottled appearance of "honeycomb" type produced by the dye in a gall bladder full of small non-opaque calculi.

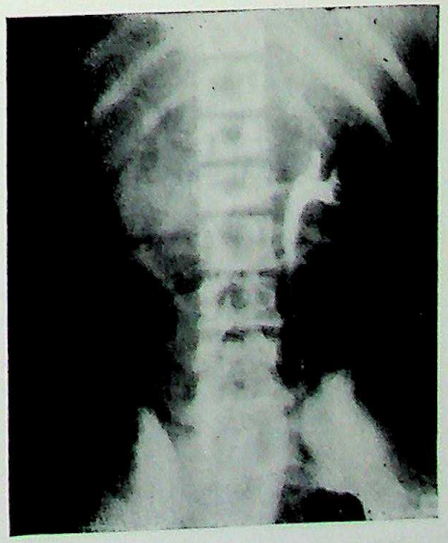


Fig. 8.—Normal pyelogram.

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Fig. 9.—Pyelogram showing kinking of the upper part of the ureter.

Fig. 11.—Intravenous pyelography in a case of a tumour in the loin of doubtful origin. The result shows no excretion from the kidney on the affected side; an enlarged, malformed kidney, with calcification in places; a typical picture of hypernephroma.

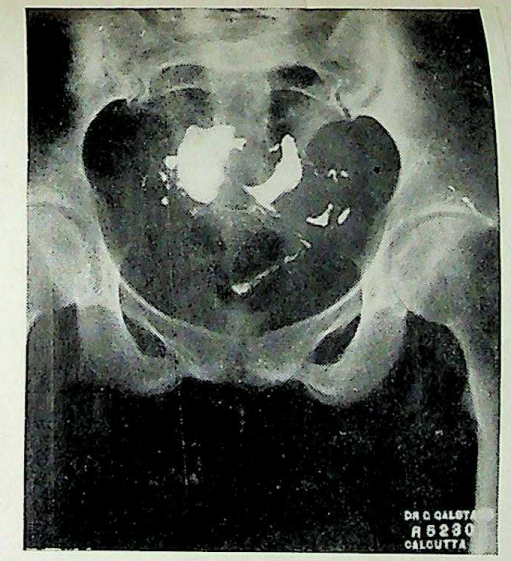


Fig. 13.—The same case as Fig. 8, 18 hours after. Note the Lipiodol free in peritoneal cavity on both sides.

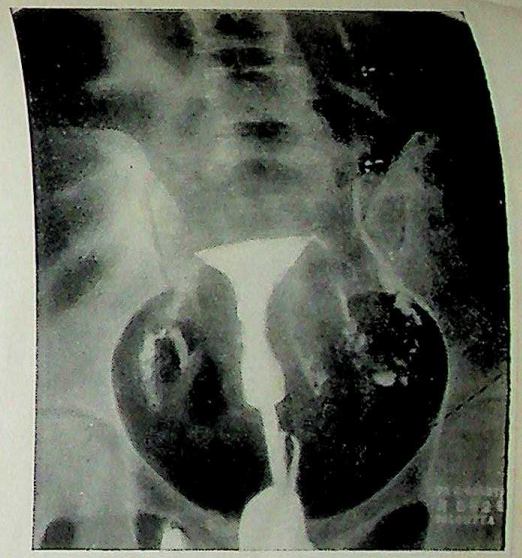


Fig. 14.—Uterosalpingography. Both tubes patent. The opaque linear shadow shown by arrows is possibly due to some injection of the utero-ovarian venous system.

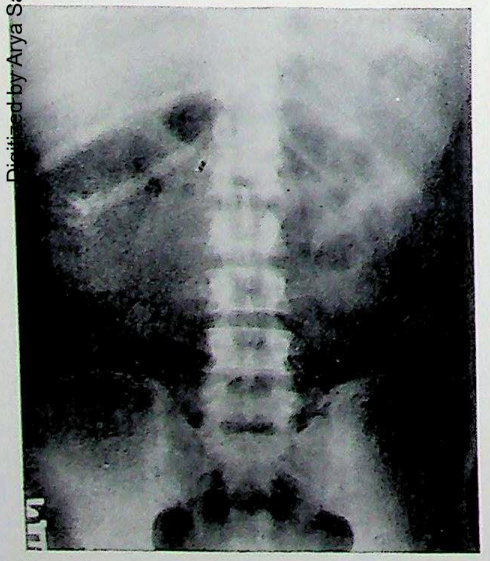


Fig. 10.—Normal intravenous pyelography, using uroselectan.

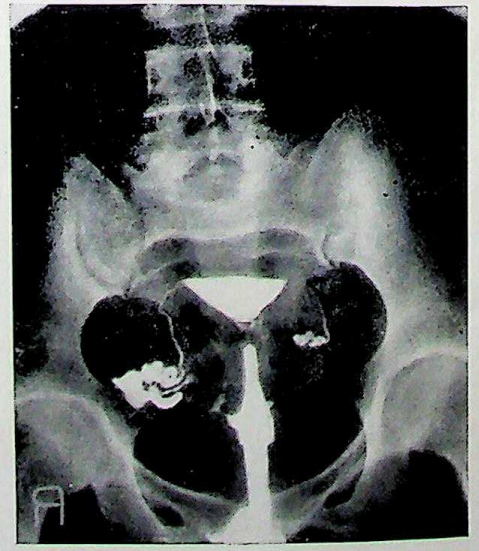
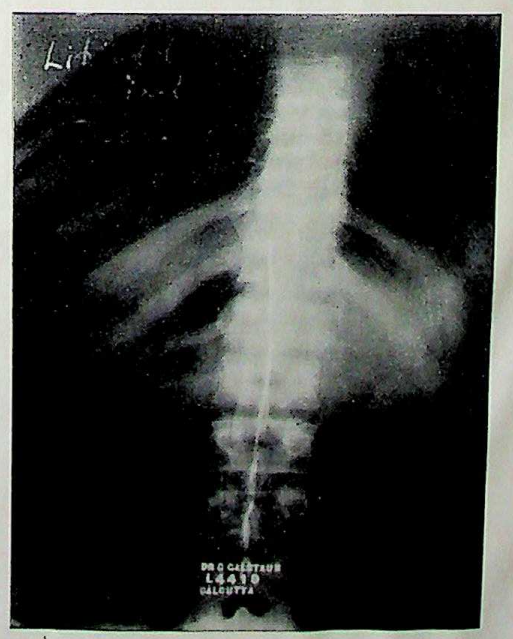
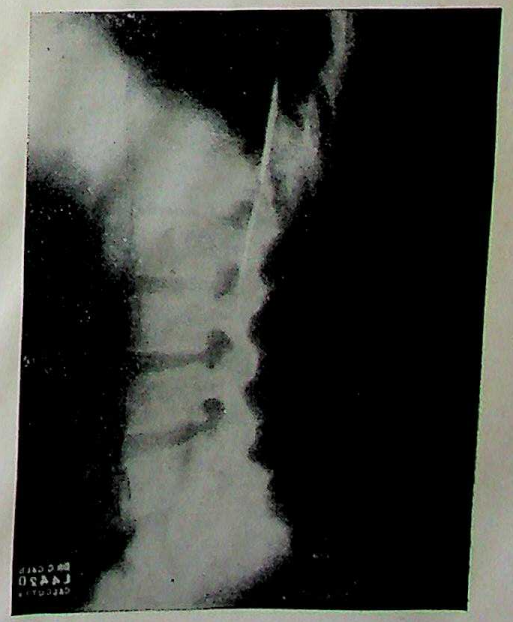


Fig. 12.—Uterosalpingography. Normal appearances.





Figs. 15 and 16.—Lipiodol in the spinal theca. Clinically the signs suggested a spinal tumour in the region of the 11th dorsal vertebra. This was borne out by the examination. The Lipiodol in this case was introduced by means of a low lumbar puncture and the fluid allowed to gravitate, the patient being placed in the Trendelenburg position on the X-ray table.

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cap or pyloric antrum. Except in the case of stones coated with calcium salts and actually visualized in the radiogram, all these appearances were somewhat conjectural. Even with the many advances in technique, due chiefly to the work of Knox of London, Carman, Case, George and others in America and Haudek in Vienna, the best results showed a correct diagnosis in only about 35 per cent. of cases.

It is due to the work of Evarts, Graham, Gregory, Cole and Copher of St. Louis that radiology of the gall bladder has been put on a more scientific basis. After trying a large number of compounds, Graham, Cole and Copher announced in February 1924, that they had been successful in visualizing the gall bladder after an intravenous injection of tetra-brom-phenol-phthalein.

Quoting from a paper published in 1925: "This procedure is based upon the theory that if any substance containing a metal or atoms of bromine or iodine can be introduced into the gall bladder in sufficient concentration, then that organ would be made opaque to *X*-rays. The substance must be one which can be given either by the alimentary canal or by injection. It would have to be a substance which would be excreted by the liver and carried to the gall bladder in the bile. Moreover the ability of the the gall bladder to concentrate its contained bile would indicate that a sufficient time must elapse before a shadow of sufficient density would occur. Reasoning from these premises, the conclusion would have to be drawn, that a shadow of normal contrast would be obtained in normal individuals. Similarly also, no shadow would be expected to appear if the liver were unable to excrete the substance in sufficient amount, if the cystic duct was occluded, or if the function of the gall bladder was sufficiently impaired to prevent the concentration of the material."

In January 1925 Graham announced considerably better results by the use of the sodium salt of tetra-iodo-phenol-phthalein. The reason was that a much smaller quantity of the drug was necessary to produce a good shadow and so the toxicity was lessened. Many of our early cases done at the Medical College Hospitals in 1925 and 1926 showed toxic symptoms. They were all done by the intravenous method as advocated at that time by Dr. James Case of Philadelphia. The method consisted in dissolving 0.06 gram per pound of body weight of the sodium salt of tetra-iodo-phenol-phthalein in 50 c.c. of sterile Ringer's solution. This was filtered and either autoclaved or sterilised in a water bath for 20 minutes. We used a No. 16 needle in one of the antecubital veins connected up by rubber tubing to, first of all, a small glass tube quite near the needle and then to a suitable funnel: 50 to 100 c.c. of warm Ringer's solution were first introduced into the funnel followed by the dye and, in turn, by more Ringer's solution. The object of the piece of glass tubing was to make sure that the needle was in the vein. Although we personally had not the experience, we had seen other cases in which the dye had been injected outside the vein with unpleasant symptoms, chiefly in the nature of severe neuritis. We usually, in our series, as we still do now, precede the dye by a meal rich in fat and protein given about an hour before. The reason for this is that it seems rational to try and empty the gall bladder before trying to fill it with anything. The results we got in these early cases were encouraging, but unfortunately the dye, as then manufactured, left a great deal to be desired. Various toxic symptoms often appeared, varing in severity from slight diarrhœa to severe headache, giddiness, nausea and vomiting. Occasionally we were alarmed by cases which showed signs of collapse with a rapid fall in blood pressure. We had one fatal case in our series. After this unfortunate occurrence we entirely gave up the intravenous method.

By this time the oral method of administration already had its champions. The dye was given in rather larger doses than by the intravenous method in keratin-coated capsules. The results we had by this method were not too good. Sometimes the capsules would not dissolve at all and at others they dissolved unevenly and the results were very far from uniform. More recently, we have been using the oral method with the dye given in aqueous suspension. We have found the proprietary preparations, Shadocol and Opacol, very effective. The technique we use now consists of the following. Forty-eight hours before the dye is given the patient is instructed to take a purgative, followed the next morning by an enema of hot soap and water, after which a control radiogram of the gall bladder is made. On the same evening the patient, who has been on light diet all day long is instructed to take the following meal: A glass of milk, with two eggs and bread and butter, stewed fruit and cream. In the case of certain Indian patients, who do not take eggs or bread, *dhall* and *loochies* have been substituted. This meal is taken at 8 o'clock. At 9 o'clock the dye is given in a large tumbler of water, followed an hour later by half a drachm to a drachm of sodium bicarbonate. This latter was found necessary for two reasons. Firstly, Cole found by means of experiments on dogs that the flow of bile into the intestines, caused by relaxation of the sphincter of Oddi, can be prevented by keeping the stomach contents alkaline. This probably tends to promote the concentration of the bile in the gall bladder. Secondly, biliary disease is often accompanied by hyperchlorhydria, and it has been a matter of experience that the dye is not satisfactorily absorbed in an acid medium.

Radiograms are taken 12 and 15 hours after the administration of the dye, the patient taking

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no food meanwhile. He is allowed water. After the second radiogram he has a meal which consists of a repetition of the fatty meal of the evening before, the object of this being to empty the gall bladder and thus, if that viscus has already been full with the opaque material, to get an indication of its muscular function. The last radiogram is taken about an hour or two after this meal. The results by this method have, during the past two and a half years, shown an accuracy in diagnosis of well over 90 per cent.

Interpretation.—If a good shadow is obtained at 12 hours, increasing density at 15 hours, and the gall bladder nearly or completely emptying after the fatty meal, the gall bladder may be taken as normal provided the shadow is a homogeneous one. If no shadow is obtained, any of the following conditions may be indicated.

(1) Impairment of hepatic function resulting in inability of the liver to produce sufficient secretion of the dye to obtain a shadow.

(2) Obstruction of the ducts, (*a*) hepatic, (*b*) cystic, and (*c*) common. In the case of the last one the absence of the shadow may be due to an excessive dilution of the dye in large quantities of bile.

(3) The dye may fail to concentrate because of inflammation resulting in obliteration of the lymphatic vessels in the wall of the gall bladder.

(4) A single large calculus or a large collection of smaller calculi in the gall bladder may obstruct it sufficiently to stop any appreciable amount of the dye entering.

In certain cases we get negative shadows of translucent stone surrounded by the opaque dye, leading to a very characteristic honeycombed appearance. This is the extreme form of mottled appearance seen in apparently not filled gall bladders due to the presence of calculi.

The point I would like to emphasize is the complete uselessness of this test in cases where jaundice is already present. Obviously if the bile passages are already occluded, the gall bladder cannot reasonably be expected to fill.

There is no doubt that in cholecystography we have at our disposal a most valuable method of diagnosis. It has become more and more a routine practice to supplement cholecystography with an opaque meal examination of the duodenum. The cholecystoduodenal syndrome has been found to be far more common than generally supposed.

The test has also been used as a measure of hepatic function. Various colorimetric methods have been used for this purpose. Samples of the bile excreted are taken by means of the duodenal tube at varying intervals, and the concentration of the dye in these samples is compared with standard colours to afford a measure of the amount of dye excreted by the liver at given intervals.

2. *Pyelography or ureteropyelography.*

Pyelography consists of the visualisation by means of *X*-rays of the ureter and renal pelvis and calyces. The method consists in passing a radio-opaque solution into the ureter and thence to the renal pelvis by means of a ureteric catheter introduced through an operating cystoscope. The first pyelograms were taken by Klose in 1904. He used a bismuth suspension as his opaque medium. The results were not very satisfactory. Voelcker and Von Lichtenberg got better results in 1906 using Collargol as their medium. Several other substances have been tried by various workers and have been discarded as unsuitable. The silver compounds, in particular, sometimes caused distressing symptoms, and fatal results have not been unknown. Braasch of the Mayo Clinic, however, in 1915 reported over a thousand pyelograms without any mishap, using Collargol. The halogen salts of sodium, the iodide in particular, were first used by Cameron in 1911; Weld at about the same time used bromide. To-day, sodium iodide is in almost general use in strengths of 12 to 15 per cent.

Technique.—No general anæsthetic is given. The patient is placed on the *X*-ray table in the dorsal position. For convenience of working, both of surgeon and radiologist, it is desirable that this table should be of the combined cystoscopic-radiological type equipped with a sliding Potter-Bucky diaphragm. The urethra is anæsthetized with any local anæsthetic, e.g., Novocain, and an operating cystoscope is passed into the bladder. After washing out the latter, a No. 5 (French) opaque ureteric catheter is passed into the ureter concerned, until arrested, when it is withdrawn a distance of one centimetre. A syringe is now attached to the open end of the catheter and any fluid in the kidney and ureter is slowly aspirated. After this a sterile solution of sodium iodide is injected by the syringe very gently. The injection should preferably be controlled by fluoroscopy. It should be stopped immediately there are any signs of pain in the loin. In certain cases, particularly in suspected hydronephrosis, this guide of pain in the loin is not reliable. In these cases, it is advisable to use a stronger solution (30 per cent. of sodium iodide) and the amount injected should be somewhat less than the residual urine aspirated. The radiograms are made immediately after the injection. They should be taken in more than one position. The lateral view is sometimes of importance. Having completed the radiograms, the injected fluid should be aspirated, as otherwise iodism may occur in susceptible patients.

The normal renal pelvis is shown as a trumpet-shaped end to the ureter. The end of the trumpet is made up of the renal calyces, in the upper one of which the opaque catheter is usually seen. The three major and several minor calyces are clearly distinguished. An

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important point in a normal pyelogram is that the ends of the calyces show some irregularities caused by the projections of the renal papillæ into the cups of the minor calyces.

Indications.—Common indications for pyelography are as follows:—

(1) Hæmaturia of obscure causation where ordinary findings are negative or doubtful.

(2) In cases of abdominal pain, especially if unilateral and particularly right-sided, of suspected renal origin.

(3) In suspected cases of hydronephrosis.

(4) In suspected cases of renal new growth.

(5) To show the relation of the ureter and renal pelvis to any obscure abdominal tumour.

(6) In certain cases of doubtful renal calculus where the differential diagnosis, e.g., from calcified lymph glands, is to be made.

(7) The routine examination of many obscure cases of renal infection.

Common pyelographic appearances.

(1) *Hydronephrosis.*—The earliest signs consist of the disappearance of the terminal irregularities in the calyces, with blunting of the ends. Clubbing and widening of the calyces may also appear and the renal pelvis may be distended. In extreme cases there is a huge distension of the whole kidney.

(2) *Dropped kidney.*—Pyelography in these cases affords valuable evidence of the position of the kidney and also of any possible kinking of the ureter which may take place. Radiograms should be taken in both the erect and supine positions.

(3) *Renal neoplasms.*—The findings in this condition usually consist in certain filling defects in the calyces or renal pelvis concerned, mainly of obliteration of the whole or parts. In some cases we get either a retraction or stretching of one or more calyces. The appearance may be one of narrowing or general distortion, the calyx appearing as an irregular narrow shadow, the so-called spider-leg deformity. All of these are in keeping with the morbid anatomy of a kidney which is the seat of a neoplasm.

(4) *Polycystic kidney.*—The appearances in this condition may be similar to those seen in neoplasm. The main differences are as follows:—

(*i*) The elongated calyces seen in new growth do not often occur.

(*ii*) Obliteration of the renal pelvis is rare.

(*iii*) The calyces are often cresentic, and

(*iv*) The condition is bi-lateral.

(5) *Congenital anomalies.*—Many congenital anomalies such as congenital large and small renal pelvis, double renal pelvis and ureters, ectopic and horse-shoe kidney, renal torsion and other conditions may be demonstrated.

(6) *Ureteric conditions.*—The most important of these is dilatation. It is almost invariably a sign of a pathological state.

The more important contra-indications to pyelography are as follows:—

(1) Severe inflammation or sepsis of the urinary tract.

(2) Renal insufficiency.

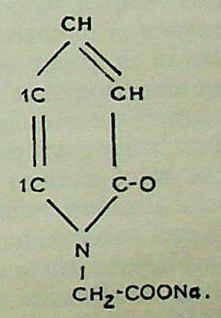
(3) A general cachetic condition of the patient.

(4) Cases in which instrumentation is followed by unfortunate results.

(5) Cases of renal neoplasm already accurately diagnosed by other methods.

3. *Intravenous pyelography.*

The work of Graham, Cole and others in the field of cholecystography has led many observers to try and find an opaque material which when injected into the blood stream, would be excreted by the kidney, thus throwing up a shadow of the renal pelvis and ureters. One of the earliest workers was Roseno, others were Osborne, Sutherland, Rountree and Scholl. These in 1923 tried the oral administration of sodium iodide. Opacity was, however, noted only in the bladder contents. Ziegler and Köhler, following up the work of Rosenstein and Von Lichtenstein, gave a mixture of sodium iodide and urea 10 grams of each in milk orally, and obtained a few satisfactory pictures. More recently Professor Bins and Dr. Raeth worked on certain organic compounds of high iodine content, and evolved a compound which was called Iodine Selectan neutral. This was tried by Swick with only partial success. Further research led to the production of a compound now known as Uroselectan, sodium 2 oxy-iod pyridine—N—acetic acid, the formula of which is as follows:—



Uroselectan is neutral in reaction, very soluble in water and contains 42 per cent. of iodine. The technique of injection is similar to that used in intravenous cholecystography. For an average patient 40 grams of Uroselectan are dissolved in 80 to 100 c.c. of distilled water and carefully filtered and autoclaved for 20 minutes before injection.

Radiograms should be made at the following times after injection; five minutes, quarter of an hour, half an hour, one hour, two hours, and in some cases where no shadow has already appeared at these times at even later periods. Care should be taken to keep the bladder emptied during the whole procedure or the dense shadow caused by the bladder contents may obscure findings at the terminal portion of the

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ureter. Intravenous pyelography is indicated in such conditions as follows:—

(1) Obstruction of the ureters or urethra, and (2) any case in which instrumentation is for any cause inadvisable.

We have not noticed any ill-effects following the injection of this compound, nor have any been reported in the literature up to date.

4. *Hysterosalpingography.*

W. H. Cary, in 1914, made the first attempt to visualize the uterine cavity and Fallopian tubes by means of the injection of an opaque material into the cervix. He used Collargol for the purpose. Cary was followed by Rubin and others. Collargol was not found to be a suitable medium as an intense reaction usually followed, sometimes with very unfortunate results. Many workers after this tried to obtain visualization of the pelvic contents by the production of an artificial pneumo-peritoneum. Rubin in 1920 published an account of 55 cases of intra-uterine tubal air inflation, now known as the Rubin's test. The rationale of this method consists in the determination of the pressure at which air can be injected. Naturally, cases in which the tubes were blocked require a much higher pressure. This test is still in general use though it is often proved to be fallacious by the more recently introduced method of hysterosalpingography, using iodized oil as the opaque medium. The first form of iodized oil to be used, and that which we still find to be the best, is the substance known as Lipiodol. This was first prepared by Lafay for the treatment of sinuses and other chronic infections in which iodine was reputed to be of value. Its opacity to X-rays was discovered accidentally. In March 1922, in a paper read before the Société Medicalé des Hôpitaux de Paris, Sicard and Forestier showed the usefulness of Lipiodol in demonstrating body cavities in the radiogram. Later the same authors reported 5,000 cases of successful demonstration by its means of the epidural and subarachnoid spaces, cold abscess, the bronchial tree, the urethra and other situations. Heuser of Buenos Ayres was the first to use Lipiodol in the uterine cavity. This was in 1921. He used the method chiefly for the diagnosis of doubtful cases of early pregnancy. More recently, the method has been elaborated by Béclère and others. Other forms of iodized oil are now available, notably Iodipin, a German preparation, and Hydriol made by Messrs. May and Baker, all of which we have found satisfactory.

Selection of cases.—It has been shown that cases of recent hæmorrhage are liable to be considerably irritated by the iodized oil; for this reason Béclère and others have advocated that the injection should not be made till the 8th day after the menstrual period is over. Definite contra-indications are as follows: Acute inflammatory conditions or active infections, malignant disease of the cervix or uterus, ectopic gestation or uterine gestation in which a therapeutic abortion is not desired. Despite the statement of Heuser and others to the contrary, there is a certain amount of evidence to show that the method has produced undesired abortions in more than one case. The other contra-indications are febrile conditions and uterine polypus.

Preparation of the patient.—A mild purgative should be given the evening before, followed by an enema the following morning, as in cases of routine radiological examination of the pelvis. In the case of nervous patients it may be advisable to give opiates before the injection. The vagina is cleaned out by douching as in any other vaginal operation and the patient is placed in the Sims' position, preferably on a cystoscopic-radiological table provided with a sliding Potter-Bucky diaphragm. The cervix is swabbed with iodine and held by a vulsellum. The syringe used for injecting the opaque medium has several special features. In many cases we have done, in collaboration with Col. V. B. Green-Armytage, I.M.S., the Béclère pattern of instrument has been used. This is provided with a manometer showing the pressure at which the fluid is introduced. The end of this instrument is introduced into the cervix and the injection slowly proceeded with; if so desired under fluoroscopic control, though this usually is not necessary. As in pyelography, pain is usually the sign to stop the injection, but both the pressure and the amount of fluid injected must also guide us as many a neurotic woman will complain of pain long before any exists.

Roentgenograms are made immediately after the injection, preferably stereoscopically. The lateral view is of service particularly in cases where preliminary bimanual examination has revealed the presence of displacement of the uterus or tubes. Radiograms should also be made at periods varying from 6 to 24 hours after the injection in order to show whether the Lipiodol has escaped through the ostia into the peritoneal cavity.

Appearances seen in the radiograms.—The normal uterus is seen as a roughly triangular shadow with its apex downwards and base upwards. From the two ends of the base (the cornual ends) will be seen the tortuous shadow of the Fallopian tubes. The ostia may be shown as trumpet-shaped ends to the tubes. In many of the normal cases the opaque material will be seen free in the peritoneal cavity immediately after injection. In some cases a constriction can be seen at the cornual end of the tube. This is believed to be due to a ring similar to that at the pyloric end of the stomach, and is probably a true sphincter. A blocked tube is shown either by complete occlusion or by occlusion at a bulbous end, past which no opaque material goes. The occlusion in some cases may be at the cornual ends. It may be at any part of the tube up to the fimbriated end.

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It has been shown in many cases of sterility, without actual complete occlusion of both tubes, that normal pregnancy has followed the injection of Lipiodol. It is probable that the iodine has a stimulating effect.

Important points in the technique of such cases are—

(1) The injection should be done after the 8th to 10th day after the menstrual period.

(2) The patient should keep lying down on the table for at least 20 minutes after the operation.

(3) No coitus should take place until six weeks after.

Chronic salpingitis is shown by an irregular distortion of the tube, sometimes with occlusion. Various congenital anomalies such as double uterus or bicornuate uterus are well shown by this method. Early pregnancy is shown by the marked increase in size of the uterine cavity. The attachment of the ovum is always seen as a filling defect in the cavity, the normal triangular outline of the uterine cavity having lost its shape, becoming roughly ovoid.

Uterine tumours.

In certain cases an injection of Lipiodol is of value to show the relation of the uterine cavity or Fallopian tubes to uterine tumours. In such cases radiograms should be taken in several positions. The method is also often of value in demonstrating the relationship of extra-uterine tumours, such as ovarian cysts, to the uterus and its appendages.

Cases have been reported by Béclère and others showing that where a ruptured or frayed endometrium is present, accidental injection of the utero-ovarian blood vessels may take place leading to startling appearances in radiograms. It has been shown, however, by experiments done by Sicard and Forestier both on dogs and on human beings that no harm results in such accidental injections.

5. *Lipiodol in the diagnosis of certain pulmonary conditions.*

It is now almost a routine practice in Europe and America to obtain in all doubtful cases a visualization of the bronchial tree by means of an injection of Lipiodol. This may be done in two ways—

(1) Using a suitable introducer in the form of a direct vision laryngoscope, a thin catheter is passed into the trachea. The patient lies on the side to be examined and the Lipiodol is slowly injected, preferably under fluoroscopic control.

(2) The more usual and better method consists in the passing of a hypodermic needle at the end of a specially constructed syringe into the trachea at the position of a low tracheotomy and then introducing the Lipiodol as before. By this method the bronchial tree is well outlined. Any irregularities such as dilatations of the bronchioles or actual bronchiectatic cavities are well shown.

Other cavities in the lung, abscesses, etc., may be demonstrated. The method may be of extreme value in determining whether or no any opacity seen in an ordinary radiogram has any connection with the bronchial system. Occlusion of the bronchi or bronchioles through any cause can be demonstrated.

6. *Lipiodol in the spinal theca.*

In cases of spinal tumours or of a transverse myelitis whenever we wish to determine the level of the lesion the introduction of Lipiodol is very helpful. It may be introduced in two ways.

(1) By a cisterna magna puncture, or (2) by a low lumbar puncture. In either case the fluid is allowed to gravitate to its final position. Before introducing the Lipiodol a rather greater quantity of cerebrospinal fluid should be allowed out.

7. *Lipiodol used to determine the tracks of sinuses.*

The injection of Lipiodol into sinus tracks, to determine their position and extent, is of great value. It is superior to all other opaque materials used for the purpose, because of its greater permeability and radio-opacity.

NOTES ON THE TREATMENT OF *B. COLI* INFECTION OF THE URINARY TRACT.

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AT the present time when *B. coli* infection of the urinary tract is beginning to be recognised generally, its treatment naturally becomes relatively more important; but it is unfortunate that much confusion exists even among men at the top of the medical profession as regards the correct principles. I resolved therefore to venture to put down the following lines in the hope that it will furnish a useful guide to a few of the readers at least.

The standard treatment for this condition is to give alternate courses of—

(1) Alkaline diuretics containing among other things potassium citrate and bicarbonate. The idea of this is to render the urine alkaline and thus make it an unfavourable medium for the growth of the organisms, which prefer an acid one. This will also be indicated when there is high fever and other constitutional symptoms.

(2) Hexamine. This drug is one of the best urinary antiseptics that we possess and acts by liberating formaldehyde. A knowledge of chemistry tells us that the splitting up of hexamine occurs only in the presence of an acid, and consequently the best results are to be expected when the reaction of the urine is strongly acid. With this object in view acid sodium phosphate (NaH_2PO_4) is given to the patient, as this is the salt which is mainly responsible for the acid reaction of the normal urine. The commonest mistake is to prescribe hexamine and acid sodium phosphate in the same mixture with the

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result that the formaldehyde is liberated in the bottle and the patient takes a weak aqueous solution of this. Formalin taken in this way does not exert any antiseptic action on the urinary focus of infection, moreover it is liable to upset digestion. Our aim is to manipulate the two in such a way that the formaldehyde shall be liberated only at the morbid focus, and not while it is in the stomach or circulating in the blood. Hexamine should therefore be given well diluted with water on an empty stomach, so that the hydrochloric acid of the gastric juice has, if any, a minimum action upon it. It is quickly absorbed in the blood and begins to be excreted in the urine in a short time. If a dose of acid sodium phosphate be given about an hour after it, the urine will be rendered acid and as hexamine comes in contact with the acid urine formaldehyde is liberated, and the maximum benefit of the drug is obtained. It is needless to say that a prolonged exposure of the bacteria to the antiseptic effects a more rapid sterilisation, and so hexamine should preferably be given before retiring at night so that it acts in the bladder for a long time.

Coming to the question of dosage, it will probably be safe to start with 30 grains a day in an adult not especially susceptible to it, and then go up to 60 or more grains in 24 hours; but as this drug sometimes gives unpleasant toxic symptoms and irritates the bladder, mainly due to a high concentration of formaldehyde in the urine, it is advisable to test the urine from time to time for the presence of the latter, and as long as this is not present in any concentration the dose can be safely pushed on.

To test for formaldehyde in the urine, dissolve 0.1 gram phloroglucin (Merck) in 10 c.c. of 10 per cent. caustic soda solution: one half c.c. of this added to 1 to 2 c.c. of urine gives a bright crimson red colour at once if the amount of formaldehyde is large; if only a little is present the colour takes 1 to 2 minutes to develop.

PELVIC HYDRONEPHROSIS.

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PELVIC hydronephrosis may be defined as a clinical condition in which there exists a dilatation of the pelvis of the ureter containing a clear fluid.

Ætiology.—Opinion still varies as to the primary factor in the causation of pelvic hydronephrosis, but most authorities agree that it is the direct result of some mechanical obstruction to the outflow of urine from the renal pelvis (9, 24).

A renal calculus held up in the ureter may thus cause pelvic hydronephrosis, but this condition is a rare one and renal calculi are more often found in the kidney tissue itself and associated with renal hydronephrosis (21, 23). A constriction is often present at the uretero-pelvic junction or occasionally lower down the ureter which then becomes dilated above it. The constriction usually shows inflammatory changes and this is probably of great ætiological importance (3, 15, 16, 24). Experimental tying of the ureter in animals leads either to pelvic hydronephrosis or primary atrophy of the kidney. The varying result is held to be due to differences in the capsular anastomotic blood supply and the degree of infection (10).

"Congenital hydronephrosis"—a condition in which the constriction shows no inflammatory changes—is probably very rare. In some of the cases reported the diagnosis has, I am convinced, been wrongly made. Because no acquired factor can be discovered, it does not follow that the hydronephrosis is congenital in origin; nor is a hydronephrosis thought to be caused by a so-called aberrant vessel, strictly speaking a congenital one. Irregularities in the fœtal ureter seem to be physiological in post-mortem specimens (2, 5, 14, 24).

Vascular complication of pelvic hydronephrosis is commonly cited as the cause of the condition. Recent work seems to show that the vessel is usually a normal inferior branch of the renal artery which appears anomalous only because the dilating pelvis draws the upper end of the ureter with it so that the vessel comes to lie immediately posterior to the uretero-pelvic constriction (15, 24).

Virchow's view that ureteral inflammation occurred sometimes during intra-uterine life is no longer held. Abnormal renal mobility, kinks and twists of the ureter have not been proved to be the actual cause of pelvic hydronephrosis. Cases of a fold of mucous membrane forming a valve in the ureter have been reported (5, 6, 9, 10, 12, 17, 19, 24). The obliquity of insertion of the ureter in the hydronephrosis is considered by many authorities to be an effect rather than a cause of the condition, although obstruction may occur in the same way as that of an artery by a saccular aneurysm (10, 22, 24). Motor paresis and achalasia may be important ætiological factors but are obviously difficult to demonstrate as such. Pyeloscopy itself probably causes abnormal contraction of the ureteric musculature (13).

Case incidence.—Although there are certainly many undiagnosed cases, the condition of pelvic hydronephrosis is rare; thus there were only 20 proven cases out of 44,000 admittances to Saint Bartholomew's Hospital during the five-year period 1923–27.

Type of patient.—The female sex appears to be affected twice as commonly as the male, each side to be equally liable to develop a hydronephrotic condition and the average age incidence to be 20–30 years (5, 24). Most patients with pelvic hydronephrosis are pale and thin—almost the exact opposite of the renal calculus type. Stone in the urinary

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tract has, however, usually to be excluded by routine examination before a diagnosis of pelvic hydronephrosis can be considered.

Symptoms.—Recurrent attacks of pain in the loin—frequently brought on by exercise—usually bring the patient with pelvic hydronephrosis up to her doctor. This pain is generally aching in character and is often eased by lying down. True renal colic may also occur and be severe enough to cause vomiting. An average history extends over a year or two with attacks occurring about once in every two or three months and lasting a few hours (1, 10, 14, 18, 24).

Several cases of pelvic hydronephrosis seen during an attack and diagnosed as acute appendicitis have been reported (7, 8, 11).

Hæmaturia is present in about 25 per cent. of the cases but usually not excessive and is therefore not noticed by the patient. Slightly increased frequency of micturition also occurs but in an even smaller proportion of cases. During an attack the temperature and pulse rate may both be somewhat raised, micturition usually remains normal, but constipation frequently results. The pain is I think probably due to increased tension in the pelvis of the ureter.

Signs.—A palpable tumour is present in about 50 per cent. of the cases and is sometimes very large and also tender. The urine, as has already been mentioned, contains red blood cells in approximately one quarter of the total number of the cases and more rarely definite pus. On culture *Bacillus coli communis* was almost invariably grown from the more obviously abnormal urines (9, 10).

Investigations.—Pyelography makes the diagnosis certain and shows whether the ureter is completely blocked or not. It is usually quite easy to pass a ureteric catheter through the uretero-pelvic constriction and 15 c.c. may be taken as the average capacity of the normal adult pelvis (4, 5, 20, 23).

More recently "Uroselectan" and similar dyes have been introduced which show up the size and shape of the renal pelvis very well on *x*-ray plates (22). The renal function on each side has usually to be investigated before any radical treatment can be undertaken.

Differential diagnosis.—An attack of pain due to pelvic hydronephrosis—although easily mistaken for acute catarrhal appendicitis—is typically not so severe. The clinical picture may closely resemble that of a case of tuberculous infection of the mesenteric glands. If the kidney is enlarged and hæmaturia is present, the differential diagnosis includes such conditions as calculus, tuberculous nephritis, tumours of the kidney and pelvis of the ureter, and even perinephric abscess. In all doubtful cases pyelography should be undertaken (20, 24).

Treatment.—In cases seen early in the disease division of the so-called aberrant vessel and adhesions found at operation may relieve the pain for a short period. Ureteroplasty has also been employed with advantage in this type of case especially when a condition of valve ureter is found to exist (17, 22, 24).

Nephrectomy—provided the other kidney is sound—would however seem to be the best treatment particularly in late and more severe cases. Preliminary aspiration is often necessary when the hydronephrotic sac is a large one. As much of the ureter below the uretero-pelvic constriction as can be conveniently secured is usually removed with the kidney. Treatment is generally successful and the patient is relieved of her symptoms.

Pathological histology.—Radial longitudinal sections taken through the uretero-pelvic constriction showed definite fibrous thickening in the submucous layer. This thickened portion gradually merged into the thinner presumably healthier ureteric tissue above and below it. The other layers appeared normal. Sections of the kidney parenchyma showed degenerative changes.

Summary of conclusions.

1. Dilation of the pelvis of the ureter is a rare condition, but is found twice as often in women as in men.
2. Patients are usually young adults who complain of attacks of pain in the loin.
3. A renal swelling is palpable in about half the number of cases.
4. Pyelography makes the diagnosis certain.
5. Nephrectomy appears to be the best treatment especially in severe cases.
6. The ætiology of the condition is not completely understood, but a uretero-pelvic constriction with vessels and adhesions around is generally found at operation.
7. Section through the constriction shows marked submucous fibrosis.

In conclusion I should like to express my thanks to the Surgical Staff of Saint Bartholomew's Hospital for the facilities they have given me to write this thesis for my Cambridge M.B. degree.

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CLINICAL EXPERIENCES WITH PERCAIN AS A SPINAL AND LOCAL ANÆSTHETIC.*

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It is a commonplace in surgical practice in India that the anæsthesia affords more anxiety to the operator than the operation. The reason for this is that competent and reliable anæsthetists are conspicuously rare. Periods of spasm, stertor and rigidity when, if the abdomen has been opened, the distended intestines are forced out past rigid muscular walls and intra-abdominal procedures are quite impossible alternate (to the harassment of the surgeon and confusion of the anæsthetist) with periods of lividity and collapse when the operator may have to interrupt or terminate his operation to resuscitate if he can the anoxæmic patient by such desperate measures as intracardiac injections of adrenalin or hooking up the tongue with a finger down the throat. Or the venous congestion reaches such a pitch (as in vaginal and rectal operations) that endless time is wasted in mopping away oozing blood in order to get a fleeting glimpse of the anatomical planes involved.

It is in order to help those who have experienced these things and who desire to dispense as much as possible with the "assistance" of such inhalation anæsthesias that I shall describe below a technique whereby in a calm unruffled scenario their surgery can be done as quietly and with greater ease than even in that mockery, cadaver surgery.

In a previous article(1), I mentioned Percain† as likely to come much into notice by reason of certain quite exceptional qualities. I have now been using this drug for over a year during which I have relied almost exclusively on it for all surgery below the nipple line. I have used it chiefly by the spinal route, for which as pointed out by Lake and Marshall(2) it has special advantages.

Percain was introduced to the notice of the profession in articles by Christ(3) and Uhlmann(4). As pointed out by them the main points about it are:

1. It is active in great dilution.
2. Its action is very prolonged.
3. In contrast to cocaine it can be boiled repeatedly and keeps indefinitely without losing strength.
4. It is the only local anæsthetic except cocaine which acts on the unbroken mucous membrane to an adequate extent.
5. It is four times as toxic as cocaine; this disadvantage is negatived in practice by the great dilution in which it is used.
6. It must not be made up in an alkaline medium, in which it is precipitated. For this purpose, if the solution is not quite clear, a drop or two of dilute HCl must be added to redissolve it.

Dilution.—For infiltration 1 in 2000 or 1500. For spinal 1 in 1000. Generally speaking it is ten times as strong as cocaine.

Duration of action.—Varies slightly with the amount and strength used, but lies between 4 and 12 hours. It will thus far outlast the longest operation and give the patient hours of freedom from pain on returning to bed. As the pain due to an ordinary cutting operation is almost entirely over in six hours, the patient often suffers no pain at all. This I have verified in a number of cases. I have employed it by the spinal method in Wertheim's hysterectomy and in abdomino-perineal excision of the rectum where even after a prolonged operation the patient has had hours of anæsthesia afterwards. Another practical example of its utility was in the case of a stout lady with almost invisible veins who had to have tartar emetic injections. I added a little percain on each occasion and at one injection a little of the fluid escaped beside the vein as was immediately apparent, but the patient felt nothing till many hours after when a dull pain was felt, and the inevitable irritation abscess developed a few days later!

Methods of use.

1. *Spinal method.*—The specific gravity of the cerebrospinal fluid is about 1007. A 1 in 1000 solution of percain in 0.5 per cent. saline has a sp. gr. of 1004. The whole technique depends on the fact that the solution of percain is thus hypobaric and will rise from the site of injection, in contra-distinction to stovain and novocain.

Technique.—The writer uses a Duttner needle (Fig. 1) as a rule because as claimed by Duttner it does not appear to give rise to headaches. This may be due to the fact that the injection cannot be given rapidly with this needle owing to its fine bore, or to the very small hole made in the meninges with it. Duttner's needle consists of

* Being a paper read at the All-India Medical Conference held at Poona in April, 1931.
† The supply of Percain used was obtained from Messrs. Kemp & Co., Queen's Road, Bombay.

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(*a*) a needle rather shorter and thicker than the ordinary spinal needle—this is passed between the spinous processes till the resistance of the posterior interspinous ligament is passed, when (*b*) the fine inner needle is passed inside it till the arachnoid space is reached and cerebrospinal fluid oozes slowly out. However, an ordinary spinal needle can almost equally well be employed.

FIG 1:

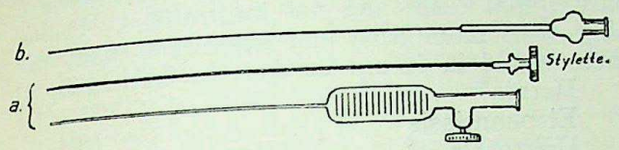
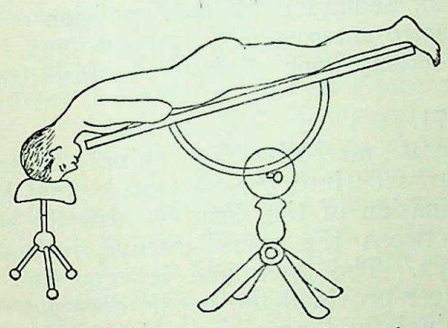


FIG 2



Solution of percain: the following formula represents 1 in 1000 strength and can be made up and kept in bulk in the theatre:

Percain—gr. 4
Pure NaCl—gr. 20
Aq. destillata—9 oz. and 1 dr.
Acid hydrochlor. dil.—min. 4

this has a sp. gr. of 1004.

Enough of this solution is boiled in a test-tube and a drop or two of adrenalin is added. A 10 c.c. Record syringe is charged with ½ c.c. more than the required dose and a fine needle is attached.

The skin of the back having been sterilised, the patient is made to lie down on his side on the operating table and the desired space between the lumbar spines palpated. The point of the needle is entered *intradermally* in this space and a weal is raised about an inch square. This is instantly anæsthetic. A cataract knife is now entered through this weal in an upward direction in the usual path of lumbar puncture, keeping strictly in the middle plane. This is followed at once by the spinal needle which is pushed on till the cerebrospinal fluid is tapped. A few c.c. of this is allowed slowly to escape, regulated by the loose insertion of the syringe containing the percain and then the latter solution is slowly injected. The patient is now at once turned *face downwards* and the head is dropped over the end of the table and may be supported in a flexed position on a stool and pillow. If the operation only concerns the legs or lower abdomen the table is tilted about 20 degrees head downwards (Fig. 2).

The patient is maintained in this position for 10 minutes regardless of whether the anæsthesia is fully developed in less time. The idea is to soak thoroughly the posterior nerve roots (sensory) rather than the motor roots which get adequate treatment when the patient is turned to the dorsal position. After 10 minutes, the patient is turned over and the preliminaries of operation begun. The patient is not asked whether he feels anything or not, but when the highest towel clip is inserted into the skin the patient's face is casually watched for any indication of pain.

The anæsthesia thus produced usually extends up to midway between the nipple and clavicle even with the table tilted as shown.

Authorities differ with regard to the amount to be injected. Howard Jones(5) and Langton Hewer(6) advocate doses of 12 to 18 c.c. of the 1 in 1000 solution. The manufacturers mention 4 c.c. The writer has often found the latter amount sufficient to give prolonged anæsthesia but has known it to be slightly incomplete with 4 and 5 c.c. and gives from 6 to 10 c.c. in all cases, except children from 10 to 15 who get 4 or 5 c.c.

It is safe to say that true failures do not occur and that if anæsthesia does not develop the requisite dose of drug has not been administered intrathecally. It is useless to expect effect if the cerebrospinal fluid is not tapped, but with practice the so-called "dry tap" becomes almost unknown. It must be remembered first that all operators will have a slight natural bias to one or other side, and also that a slight degree of scoliosis is not at all uncommon in the presence of which one must remember that the bodies of the vertebræ are displaced more laterally than the spines. However in case of failure it is consoling to read Meredith Campbell's admission of 2.9 per cent. of failures(7) in a series of 1,520 cases (under novocain).

It is quite immaterial where the injection is given provided this is in one of the lumbar interspaces. The 4th lumbar spine is on a level with the line joining the highest points of the iliac crests and I almost invariably give it immediately above this.

The principal advantages of spinal anæsthesia are seen in abdominal work where the intestines, lying contracted and motionless inside a completely relaxed abdominal wall, allow the fullest freedom to intra-abdominal procedures, especially in the pelvis. It is astonishing to see for the first time the ureters swinging up and down behind the peritoneum in peristalsis like worms, where they cross the iliac arteries at the brim of the pelvis as may be seen with the patient in the Trendelenberg position. The great advantage of percain, as mentioned above, is the very prolonged anæsthesia it gives.

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Difficulties and dangers.—These are not special to percain but occur in greater or less degree with all drugs given by the spinal route.

1. Fall of blood-pressure. This is quite commonly seen. It is usually associated with anoxæmia, the patient going a bad colour and showing a very feeble radial pulse. It can be effectively guarded against by the administration immediately beforehand of ephedrin gr. ½ with adrenalin m. 10. Ampoules of similar formula are put up by several firms. The anoxæmia can be easily dispelled by inhalation of oxygen and carbon dioxide mixed in suitable proportion, but this remedy can only be given by a skilled anæsthetist. Some authorities advocate the injection to nervous patients of the well-known mixture of morphia and atropine beforehand, but I prefer not to give it as a rule for fear of increasing the tendency to anoxæmia, which is due to fatigue of the respiratory centre and contributed to by paralysis of the lower intercostals. Paralysis of respiration is said never to occur, but in two early cases where a large dose (20 c.c.) of the 1 in 1000 solution was given, we had to do artificial respiration for a short time before respiration was spontaneously resumed.

2. Vomiting. There is sometimes a tendency to this especially early in an operation. It occurs in all types of case and rarely persists. It can be stopped by injecting a few c.c. of the percain solution into the cardiac end of the stomach close to the œsophagus. It is very uncommon after the patient has left the theatre.*

3. Headache. Probably less frequent with percain than with any other spinal anæsthetic. Can usually be prevented or cured by ephedrin. Twenty c.c. of 50 per cent. glucose or an equal amount of 10 per cent. saline are given as cures, but I have never had a case requiring more than ephedrin.

4. A sharp rise of temperature, occasionally with a rigor, is not uncommon in my experience, but as it is not mentioned by other writers it may be confined to the tropics or due to some slight impurity in the solution. It never lasts long and does no harm.

5. Retention of urine. Quite exceptional and never persists.

6. Pulmonary complications. Said to occur about as frequently as with inhalation anæsthesia. This is not so in India, perhaps because our anæsthetics are usually so badly given. One of my cases, a severe ascites case on whom a Talma-Morrison operation was done, with rather vigorous treatment of the under surface of the diaphragm developed pneumonia a fortnight afterwards and died out of hospital. In fact "poitrinaires" and chronic bronchitics afford in my experience a strong indication for spinal rather than general anæsthesia, but with the hypobaric solution of percain it is inadvisable to sit them up till two hours after the injection.

Owing to transfers a complete list of cases in which spinal percain was given cannot be added, but the following list of cases operated on by the writer at Surat between 10th December, 1930, and 3rd March, 1931, shows that a variety of representative surgical conditions have been dealt with by this method. I include only spinal cases and not infiltrations. Probably with more time and experience many of them would in future be done by infiltration.

Hernia	18
Elephantiasis	10
Hydrocele	7
Cholecystectomy	3
Prostatectomy	2
Osteomyelitis, radical cure ..	2

Arthrectomy of the knee, amputation of the leg, nephrolithotomy, total hysterectomy, subtotal ditto, abdomino-perineal excision of rectum, gastro-enterostomy, gastrostomy, and appendicectomy one each, and miscellaneous twenty.

Total 71.

2. *Sacral method.*—The spinal needle is passed upwards into the vertebral canal below the termination of the dura through the sacral hiatus between the sacral cornua just above the coccyx. The technique is easy and free from danger provided the needle does not reach cerebrospinal fluid nor remain in a vein. The spinal needle should be passed in its full length and gradually withdrawn as the injection is made: 30 to 50 c.c. of 1 in 1000 solution are used and the anæsthesia may take 20 minutes to develop but lasts a long time. It is limited to the perineum, vagina and pelvic organs. A very good method for fistula *in ano.*

3. *Infiltration method.*—Use 1 in 2000 or 1 in 1500 strength with about 3 per cent. adrenalin added after boiling. Besides the ordinary minor operations, simple laparotomies on very debilitated patients can be done with this, especially if they are given a preliminary dose of morphia and atropine. I am told it is excellent for the big plexus blocks, for cœliac ganglion block and I have found it most useful in fracture cases after the method of Boehler, abolishing pain and spasm when injected between the broken fragments.

It is not uncommon for infiltration to be unsatisfactory in stout patients because much of the drug gets diffused into the fatty layer. In such cases the incision line can be anæsthetised instantly by the intradermic method. Owing to the great dilution, healing is not affected adversely.

4. *Surfaces and mucous membranes.*—Painful dressings, ulcers and burns—a 1 in 1000 percain pack (with the usual addition of adrenalin 5 drops to every 10 c.c. as a maximum) may be applied, stronger or weaker according to the length of time it is to act.

* We have recently found that the administration of a few breaths of oxygen is most effective in stopping both this tendency to vomiting and the accompanying anoxæmia and fall of blood pressure.

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Urethra and bladder—a few c.c. of 1 in 500 strength allowed to remain in contact for 5 minutes gives prolonged effect.

Throat and nose—a spray or painting of 2 per cent. percain gives excellent anæsthesia, as good as 10 per cent. cocaine and a great deal more lasting.

Eye—I am greatly indebted to Lieut.-Col. J. N. Duggan of Bombay for the following observations on percain in eye work. "My observations were based on a small quantity of half a phial from a sample bottle given me by you for trial. The strength of cocaine used for comparative purposes was 4 per cent.

"Instillation of percain (a drop every 3 minutes) in a solution of 1 in 1000 brought on complete anæsthesia of the eye in 10 minutes. In a solution of 1 in 500 the anæsthesia was brought on earlier. No congestion of the conjunctiva, etc., was noticed in a solution of 1 in 1000 but the strength of 1 in 500 demanded admixture with adrenalin to counteract the congestion produced.

"Operations performed under its influence varied from the mere removal of a foreign body, incision of cysts, removal of pterygiums, etc., to the more painful kinds such as chopping off prolapsed iris, etc., in all of which it was as good as cocaine. However the chopping off prolapsed iris is painful just as it is under cocaine anæsthesia. I have also tried it with success in cases of cataract, trephining, iridectomy.

"I would certainly place it on equal footing with cocaine as far as anæsthesia goes in eye work. Its chief advantages are:—very little smarting, no action on corneal epithelium, pupil and tension of the eye."

Miscellaneous.—The effect of spinal anæsthesia in labour is of interest. I have only given it once. Labour became entirely painless and it was curious to observe the uterus in contraction and relaxation through paralysed abdominal walls. One expected some delay in the second stage from absence of the expulsive efforts of the voluntary muscles, but this did not seem to be the case. The fœtus was expelled by the uterine contractions through a completely relaxed pelvic floor without difficulty or damage, and contraction and retraction of the uterus appeared normal.

In these days of financial stringency, the cost of our drugs is important. Percain by virtue of the dilution in which it is effective is most economical in use. In fact, by the spinal method it must be by far the cheapest anæsthetic, for it costs less than an anna per grain and each spinal anæsthesia takes about 1/10th of a grain of percain.

Formulæ.—In addition to the formula for the stock solution given above, the following may prove useful:—

1. Percain .. part 1.
   Olive oil .. parts 40.
   Zinc paste .. to parts 200.

A paste for application to painful areas.

2. Percain .. part 1.
   Ext. hamamelidis .. parts 10.
   Lanoline .. to parts 100.

An ointment for piles.

3. Percain .. gr. 1/6th.
   Cocoa butter .. gr. 40.

As a suppository.

Summary.

1. Clinical experiences with a relatively new local anæsthetic are described, especially with reference to its spinal application.
2. This drug, percain, is far stronger and produces a much longer anæsthesia than any other, by whatever route it is used.
3. It is not fool-proof and requires a special technique which is described in detail.

REFERENCES.

(1) *Indian Med. Gaz.*, April 1930, Vol. LXV, p. 218.
(2) *Brit. Med. Journ.*, 15th March, 1930, Vol. I, p. 488.
(3) *Narkose und Anæsthesie*, 15th June, 1929.
(4) *Ibid.*
(5) *Brit. Journ. of Anæsthesia*, April and July 1930.
(6) *St. Bartholomew's Hospital Journ.*, February 1931.
(7) *Brit. Journ. of Surgery*, September 1930.

CORRIGENDA.

WE regret that in the correspondence by Dr. S. L. Sarkar in our issue for February 1931, p. 118, two mistakes have occurred. The dose of Ferri arsenias should have been "gr. 3/80" not "gr. 3/30," and one item, "Pulv. rhei gr. 1," was omitted.—(EDITOR, *I. M. G.*)

WE regret that in the article by Major McIver and Dr. Nisanath Ghosh in our issue for April 1931, p. 196, the former's name has been omitted from the heading of the paper. The heading should read as follows:—

HALOMETRIC READINGS IN INDIANS.

(A PRELIMINARY NOTE.)

By COLIN McIVER, M.R.C.S., L.R.C.P., D.T.M. & H., MAJOR, I.M.S.,
Superintendent, Berry-White Medical School,
and
NISANATH GHOSH, M.B.,
Teacher of Medicine, Berry-White Medical School, Dibrugarh, Assam.

The line on which Major McIver's name appeared was wrongly deleted by the printer.

We feel that in justice to the editorial staff it should be pointed out that the name appeared correctly in the final proofs; the mistake was made whilst carrying out corrections before printing off the number.—(EDITOR, *I. M. G.*)

A Mirror of Hospital Practice.

A CASE OF BRADYCARDIA.

By K. J. PANCHOLY,
Medical Officer, Vaidia State (Kathiawar District).

Previous history.—The patient was a Hindu male, aged 42 years.

He gave a history of having suffered from muscular pain from 1917 to 1921 off and on. He had an attack

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of influenza in 1919, with fever for 21 days. From 1922 to 1926 he was well.

In August 1927, at night he awoke suddenly, felt giddy with everything rotating round him. He had a desire to pass stools after which he fell down suddenly.

He had the same kind of symptoms again in September, 1927, November and December, 1928, and April, August and November, 1929. From November, 1929, up to the present date he has had no attack.

At present he can walk slowly for a mile without any symptoms suggestive of heart disease, except uneasiness and pain in the cardiac region. He does his ordinary work. His appetite is fairly good. His heart beats are 28 per minute. Pulse rate per minute corresponding with heart beats on both sides, and is regular in rhythm.

Blood-pressure—130 systolic and 98 diastolic.

He does not know whether he had the same slow pulse previously. He only came to know about it after he felt giddy in 1927.

The main point of interest is that he is robust and not anæmic. He does his routine work like an ordinary healthy man. Seeing him nobody would have any idea that he had a pulse rate of only 28 beats per minute.

AN UNUSUAL FOCUS OF *B. TYPHOSUS* INFECTION.

By B. P. TRIBEDI, M.B.,

Clinical Pathologist, Medical College Hospital, Calcutta.

A MOHAMMEDAN male, aged 43, was admitted into the Medical College Hospital with the complaints of slight irregular fever and heart trouble. The case was labelled in the ward as "chronic malaria with mitral stenosis." He was having the usual treatment. After about a fortnight in the hospital he complained of a painful swelling in the scrotum and on examination the scrotum was found to be inflamed. On aspiration, pus came out and bacteriological examination of the sample of pus yielded a pure growth of *B. typhosus*. The patient was operated on and another culture was made from the operation wound which corroborated the previous finding. Widal reaction of the patient's serum gave a strong positive reaction against *B. typhosus*. *B. typhosus* was also recovered from both fæces and urine.

On careful enquiry from the patient it was learnt that he had a severe type of fever some 4 or 5 months before and after that he never felt well.

The patient was making a good recovery when a month after the operation he developed symptoms of a typical biliary colic. *X*-ray examination showed two stones in the gall-bladder. An operation was performed and the stones were taken out; these were quite soft and on culture yielded *B. typhosus*.

The patient made an uninterrupted recovery and was let out of the hospital after repeated examination showed no *B. typhosus* in urine and stool.

It is interesting to note the formation of the gall-stones within such a short period.

I am grateful to Dr. B. L. Mazumdar, Additional Physician, Medical College Hospital for allowing me to publish this case.

A CASE OF ENTEROGENOUS CYANOSIS.

By FLORA R. INNES, M.B., CH.B. (Edin.),

Medical School for Women, Vellore (South India).

IN August 1926, there walked into a village dispensary a man showing such intense cyanosis that I thought he must be dying. I discovered, however, that he had come to have a large blister on the mucous surface of his upper lip incised and that the cyanosis was of two years duration. On incision a quantity of serum escaped.

History.—Two years before he had had a severe fever for three months, onset with chills, fever and severe headache; he was unconscious for about six weeks and after that his tongue and lips "became black" and also the whole body, and had remained so ever since. Throughout the fever there was moderate diarrhœa. On recovery, indigestion with flatulence with marked borborygmi, abdominal pain and diarrhœa began, and have continued ever since. His motions watery and undigested, three to seven a day, were associated with griping pains before and after. On exertion he had difficulty in breathing and pain over the præcordia, his legs became stiff and he had to stop and rest. He complained also of more or less constant peculiar pulling pains in various parts of the body—these occurred when at rest and at times grew very severe—in the temples, the neck, the thorax, and the lumbar regions, in the recti and in the testicles. There was no evidence of neuritis.

We brought him to hospital for investigation—sought for signs of arterio-venous aneurism in vain and could not interpret the pulling pains. On resting the intense cyanosis decreased within four days to a more moderate degree. He was a well-built man and fairly well nourished. No œdema and no dilated veins in neck or limbs were observed.

Heart: Percussion dullness not increased, both sounds accentuated in all areas, no murmurs. Rate varied from 80—110 per minute.

Pulse: Vessel wall thickened. Blood-pressure not raised.

Respiratory system: Respirations, 20—40 per minute. He had an occasional cough with scanty sputum—nothing abnormal found in it. Percussion and auscultation revealed nothing abnormal.

Digestive system: Abdomen full, marked tenderness in right hypochondrium and over the sigmoid region with gurgling under the fingers. Sometimes some local distension was visible in the hepatic flexure region of the colon, associated with pain. Diarrhœa, daily 5 to 7 motions watery and undigested.

Blood examination: No malarial parasites found. Hæmoglobin 75 per cent. Red blood corpuscles, 4,824,000. White blood corpuscles, 8,260.

Differential count:

Polymorphonuclears	..	63 per centum.
Lymphocytes	..	19 " "
Large mononuclears	..	5 " "
Basophils ..	..	0.5 " "
Eosinophils ..	..	12.5 " "

We sent him home undiagnosed and in the same condition. I saw him at intervals during 1927 and 1928 during which time his cyanosis, pains, diarrhœa and general condition continued. In February 1930 after a long interval I saw him again, he was obviously weaker and looked emaciated, the breathlessness made exertion difficult, the abdominal symptoms especially the pains and flatulence were more severe, the diarrhœa was as before and the pulling pains caused great distress. He was desperate and begged me to do something, so I brought him to hospital again.

Hitherto I had interpreted the diarrhœa as due to the chronic venous congestion, but now I approached it as possible cause and not the result. I had not known either how to interpret the history of the onset with prolonged and severe fever, but we had had a series of atypical dysenteries in which prolonged fever with unconsciousness and slight bowel symptoms were characteristic. Again, the peculiar pulling pains suggested chronic tetany which is a common accompaniment of the bacillary dysenteries. So, enquiring into his diet reactions we found that rice was passed undigested in the stools; thus a Flexner infection was suspected. His agglutination report confirmed this.

Flexner	..	..	.. 1 in 200
Shiga	..	..	.. 1 in 50

His alkali reserve was 0.018 mgm. per 100 c.c

We put him on a drachm and a half of sodium bicarbonate three times a day and on protein diet, and after a fortnight sent him home to continue this

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treatment, still cyanosed and in much the same condition. Simply because I was experimenting in the use of bilivaccine in the treatment of bacillary dysentery, I gave him six tablets to be taken at home, one each morning. He turned up at the weekly village dispensary the next week with the cyanosis gone and stated that after the third tablet his blood had turned red and had remained red ever since. He also stated that he passed in the stool a small oval stone that crumbled to pieces when crushed with a stick (enterolith ?). He continued his alkali and such protein diet as he could obtain in his village until July. He had not gained in weight; the abdominal pain and diarrhœa and the pulling pains still caused great distress and because of these he could not work though the cyanosis and breathlessness were gone. So we brought him to hospital and gave him for six weeks a protein-vitamin diet with a minimum of carbohydrate. The alkali reserve was 0.021 mgm. per 100 c.c. So alkali was increased to 2 drachms every 3 hours, and calcium lactate, gr. xxx, twice daily was given. He improved steadily; the stools became formed, pains disappeared, he gained in weight visibly and in September he became a hospital peon, digesting full ordinary diet without any relapse and was full of energy, lifting and carrying with no difficulty.

All this time we did not know the name of the condition, or the cause of it and could find no reference to it in the books. Finally a short account was found in Cecil's Textbook of Medicine, 1929, p. 966, from which I quote the following:—

"The term enterogenous cyanosis was introduced in 1902 by Stokvis who described a case of chronic cyanosis without cardiac or pulmonary lesions or evidence of drug poisoning. Spectroscopic examination of the blood showed the presence of methæmoglobin. Since then over 20 other cases have been reported. The cyanosis depends on the partial replacement of the circulatory hæmoglobin by the relatively more stable pigments methæmoglobin or sulphæmoglobin which can be demonstrated by careful spectroscopical examination. The cause of this rare condition is unknown. Attempts to explain the methæmoglobin or sulphæmoglobin as the result of the absorption of toxic products from the intestinal tract are unsatisfactory. Cure of the associated intestinal condition apparently causes the disappearance of the cyanosis in the majority of cases, but such evidence is at best difficult to interpret. Boycott's discovery of methæmoglobinæmia in rats in association with an affection by Gaertner's bacillus is the only experimental evidence that intestinal infection may have a causal relation to the condition. A valuable discussion of the condition has recently been published by Vogel who reports a case due to the ingestion of sulphur and the absorption of nitrobenzene.

The two characteristic clinical features are intense cyanosis and marked intestinal disturbances both of long duration. Secondary symptoms are weakness, dizziness, headache and occasionally clubbing of the fingers. Dyspnœa is usually not a feature. In undoubted methæmoglobinæmia diarrhœa develops and nitrites are present in the blood. Patients with sulphæmoglobinæmia, however, usually suffer from marked constipation. No other pathological findings in the blood or body have been reported."

A CASE OF PSEUDO-HERMAPHRODISM.

By A. K. DUTT GUPTA, M.B., D.T.M.,
Assistant Surgeon, Medical College, Calcutta.

It is said that a true hermaphrodite has not been found alive. Early in intra-uterine life, the embryo has the structures from which both the male and female generative organs develop. The preponderance of growth of either the Mullerian or Wolffian duct determines the sex. At the 12th week of embryonic life the external generative organs are so far differentiated that it is possible to distinguish the sex. In both man and woman there is some remnant of the other sex. In the case of some abnormal development we may get a pseudo-hermaphrodite.

The patient, aged 15 years, was admitted in the wards of Sir Frank Connor for rapidly enlarging breasts. The parents had noticed that the child had a small and peculiarly shaped penis and one testicle only. They did not think much was wrong, but this rapid development of the breasts during the last year and a half, before which there was no abnormality,

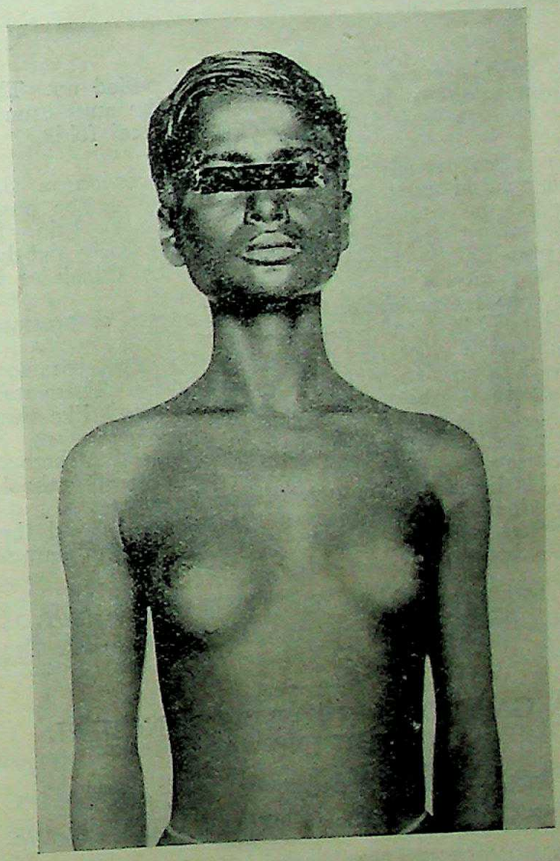

Fig. 1.—The accessory nipple can be seen in the lower half of the right breast.

made them nervous about the child being a hermaphrodite.

On examination.—The breasts looked more shapely and more developed than those of a girl of the same age. On the right side there was an accessory nipple. The feel was that of real female breasts.

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On examination of the genitals it was found that the penis was very small, about one inch long, with the urethral opening about the middle of the ventral aspect of the penis (hypospadias); on the left side of the scrotum there was a small testicle, but the right side was empty; the right testis could not be felt anywhere.

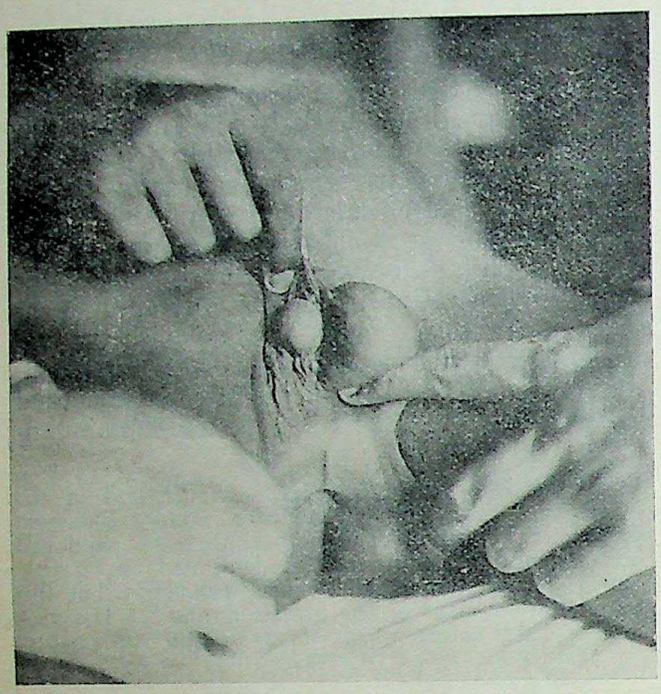


Fig. 2.—The penis and left testis are pulled up. The depression shown is the (?) vagina. The anus cannot be seen as it is hidden by the gluteal folds.

The most peculiar thing was a depression in the perineum, in front of the anus, exactly in the position of the vagina, covered with ordinary skin. It would admit the tip of the index finger fairly tightly. On pressing, the finger would go in for ½ inch as if into a cavity.

On rectal examination no sign of uterus or prostate could be felt.

The child's voice was more of the feminine character. There was no sign of beard or moustache. There was an occasional white discharge from the penis like thin semen, but never blood.

As regards treatment, it was thought best to remove the breasts as his position was miserable in the school. Also his life would be much better as a boy.

Histological examination of the breasts showed the characters which are usually found in the nulliparous female breast.

I am grateful to Sir Frank Connor, D.S.O., I.M.S., for his kind permission to publish the notes.

A CASE OF PRIMARY BRONCHIAL CARCINOMA.

By A. K. DUTT GUPTA, M.B., D.T.M.,
Assistant Surgeon, Medical College Hospital, Calcutta.

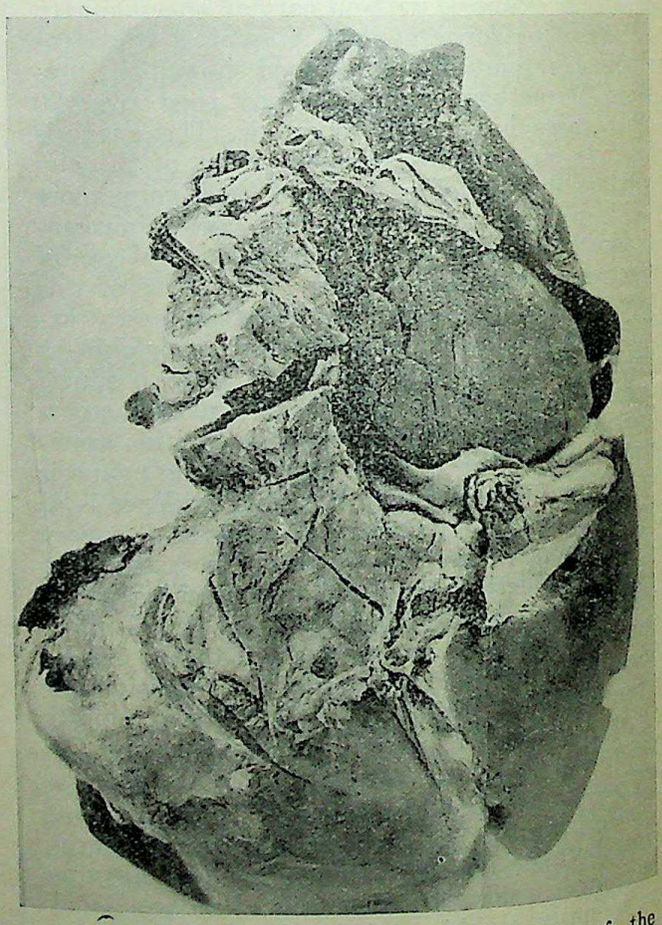
BRONCHOGENIC carcinoma is not very rare in Europe. Weller in 1913 was able to collect from the literature 90 cases of primary carcinoma of the bronchi and T. Macre and others since then collected 128 cases and add 14 of their own. Simpson has analysed 139 cases where the diagnosis was confirmed or arrived at by autopsy. The disease is really increasing in incidence in Europe. Rolleston in 1903 had found 8 cases of intra-thoracic growths out of 3,983 autopsies. The following case is of interest being the first case diagnosed in the Medical College of Bengal.

The patient, Hindu male, aged 30 years, was admitted in the hospital under Sir Frank Connor for pain in the right hypochondriac region and associated weakness and emaciation for the last four months. He had fever and pain in the liver and was given 14 injections of emetine during this time.

On admission to the hospital, the liver was found much enlarged below the costal margin. There was dullness in the right side of the chest, continuous with that of the liver and extending about 2 inches below the clavicle. No breath sounds were audible over the part. The intercostal spaces were obliterated and the skin was œdematous. The apex impulse of the heart was in the normal place.

The leucocyte count was 17,500 per c.mm., polymorphonuclears 80 per cent., lymphocytes—17 per cent., hyalines—2 per cent., and eosinophiles—1 per cent. The clinical diagnosis was liver abscess and he was aspirated in the part most bulging, i.e., in the mid-axillary line of the 6th intercostal space. There was no pus but 10 ounces of amber-coloured clear fluid was removed (Simpson had found it in 22 per cent. of his series).

The *x*-ray picture 2 days after this showed no enlargement of the liver but suggested fluid in the pleural cavity, possibly a cyst in the mediastinum. A few days after, he was aspirated again when 6 ounces of fluid was removed. He was sent immediately for *x*-ray examination, where it was found that the right side of the chest was opaque excepting the upper part, but no evidence of any cyst could be detected.



The illustration shows the ulcerated walls of the tumour with the upper lobe compressed—pericardium opened—liver adherent to the tumour base.

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Pathological examination of the fluid showed preponderance of lymphocytes, corroborating Simpson's results, but no malignant cells. Culture was sterile. He was discharged three weeks after admission in a much better condition of health. The pain and œdema had disappeared. There was still some dullness at the base of the right lung, but breath sounds were more audible. The liver was normal in size. The clinical diagnosis at the time of discharge was "pleurisy with effusion."

He was admitted three months later for the same symptoms as before, pain in the liver region and chest. He had himself noticed during this time that the glands all over his body were getting enlarged. On examination the following conditions were found (*a*) glands all over the body, including epitrochlear, supraclavicular, inguinal, were enlarged, hard and discrete. (*b*) Oedema of the right side of the chest, abdomen and arm. (*c*) Absolute dullness of the right chest up to the clavicle, breath sounds being present only above the second rib. (*d*) Small hard nodules under the skin in the right chest. The nipple was retracted as in carcinoma of the breast. (*e*) Proptosis of the right eye.

A nodule from the skin was removed under novocaine and the histological report was bronchogenic carcinoma "Alveoli lined with medium to tall tapering and irregular columnar cells—some spaces were rounded, others elongated and tortuous. In conjunction with the history and clinical features suggest the origin from the pulmonary bronchioles."

The patient died about a month later. During this time he had signs of pressure in the veins of the right hand and neck. More skin nodules appeared all over the right side of the chest and abdomen. There was no hæmoptysis at any time. Dyspnœa was only present a few days before death. There were no cerebral symptoms. He was aspirated once; 2 ounces of similar fluid as before was removed.

Post-mortem examination.—The right side of the chest was found to consist of a huge cavity filled with a little hæmorrhagic fluid, the lower, inner and upper walls being made up of solid white hard almost cartilaginous malignant growth, the outer wall being made up of thickened pleura. The upper lobe of the right lung was shrunken and pushed up, the other two lobes having been destroyed.

There were metastases in the other lung. All the glands in the body including the mediastinal and abdominal were enlarged and hard and on section showed signs of metastases. The liver and kidneys also showed metastases. The intestines were free. The skull was not opened.

One important feature of the case was extensive dissemination of the disease. Simpson found skin lesions in less than three per cent. of his cases. But in none of his cases were the epitrochlear or inguinal glands affected.

I am grateful to Sir Frank Connor, *Kt.*, D.S.O., Lieut.-Col., I.M.S., for his kind permission to publish the notes.

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CONTRAINDICATIONS IN THE USE OF THE SPHYGMOMANOMETER.

By INDULAL S. DAVE, M.B., B.S.,
Railway Medical Officer, Baroda State.

IN the following two cases the application of the sphygmomanometer to the arm of the patient caused alarming symptoms:—

Case 1.—A school-master about 60 years of age attended my clinic about a year and a half ago. He complained of giddiness, headache, etc., and his temporal arteries, even seen from a distance, were quite tortuous and pulsating. After clinical examination, I thought it better to record the blood pressure for future reference. I called my sub-assitant surgeon with the sphygmomanometer. He applied the armlet. Then I put my stethoscope to the patient's antecubital fossa and began to pump air by working the india-rubber ball. When the mercury began to rise the patient began to complain of throbbing in the heart area, increased giddiness, severe headache, and he began to breathe very hard. I was all the while going on with my work so as to finish it as soon as I could, but the patient resisted. He grew very cyanosed. I finished my work and I found his blood pressure to be systolic 200 mm. and diastolic 120 mm. Usually we verify the result by a second examination on the spot, but in this case I did not dare do it for fear of causing apoplexy and hemiplegia in the patient, thereby prematurely damaging the old man. Thereafter I gave the patient complete rest for three days, after which he was able to attend his school. For the whole of the day after the blood pressure was taken, he continued to feel giddy and had more headache than usual. On the second day he felt a bit better. The patient, I am glad to say, survives even till to-day, but he is never free from his troubles and more so now than formerly.

Case 2.—I was called in in consultation over a heart case. The patient was a venerable old man of about 63 years, the principal of a local high school. He had myocardial degeneration. When I saw him first, he had œdema of the face, feet and abdomen. The liver was a ball-like swelling in the epigastrium and right hypocondriac region. After a few days' treatment, the swelling had gone down, the liver also proportionately but was almost double the normal size. The pulse was 40 at the wrist, and there was a reduplicated first sound with each heart beat and arrhythmia. The attending physician had tried his sphygmomanometer on the patient once or twice before. He was persuaded to take the blood pressure, as the heart had improved a bit by now. So the instrument was again brought in and applied. No sooner had the bellows begun to work than the patient felt restless—complained of throbbing in the heart area, giddiness and noises in ears. The attending doctor had applied the stethoscope to the bend of the elbow, so with a view to verifying the reading by feeling the pulse I took up both wrists. From the feeling of the pulse of the other arm, I thought the earlier the examination finished the better. The reading was systolic 180 mm. and diastolic 110 mm. The patient did not show any very marked symptoms during the course of the day, though the headache persisted for a few hours.

These two cases have brought me to the conclusion that the sphygmomanometer should be used with a certain amount of caution in cases of chronic Bright's disease, arteriosclerosis, atheroma of the aorta, myocardial disease, etc.

COMPLICATIONS DUE TO ROUND WORMS IN GASTRO-INTESTINAL SURGERY.

By M. ABDULLA, L.M.&S. (Hyd.), L.C.P.&S. (Bom.),
Medical Officer In-charge, Municipal Hospital, Vaniyambadi (N. Arcot).

THE vagaries of round worms in the gastro-intestinal canal have become proverbial, and very unusual cases have been reported from time to time. Here is the record of a case which has some special features.

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A Hindu, aged about 35 years, was admitted in my hospital for chronic duodenal ulcer. Posterior gastro-jejunostomy was performed under local anæsthesia. Fine silk sutures were used, as fine catgut was out of stock. All went well for the first three days. As suggested by Dr. G. H. Juilly in his book on "Practical Surgery of the Abdomen" he was given nothing by mouth on the 1st day except sodium bicarbonate, 2 per cent. in tap water, per rectum, by means of Murphy's drip; on the 2nd day Murphy's drip of glucose 5 per cent., and sodium bicarbonate 2 per cent. and a few teaspoonfuls of boiled water by mouth; on the 3rd day an enema, more water by mouth and Murphy's drip of glucose per rectum.

On the 4th day morning the patient developed incessant hiccoughs which complicated very much the after-treatment of the case. He complained of extreme thirst and exhaustion, pain and distension of the abdomen and inability to pass flatus. On examination, his face was pinched, tongue dry and his body was covered with cold and clammy perspiration. His pulse was 125 a minute and temperature 99.6 only. His lungs and heart were normal, abdomen tympanitic and tender.

The question of peritonitis or post-operative paralysis of the stomach arose. Which it was, was very difficult for me to say. Turpentine abdominal stupes and enemata, injections of atropine, pituitrin, adrenalin and insertion of a rubber tube into the stomach did not relieve him of his sufferings. The next day morning, i.e., on the 5th day, he vomited a small round worm with a little water that was given to him. This prompted me to try a little santonin, with very happy results. In the evening I gave him 2 ounces of castor oil which resulted in the evacuation of 4 large loose motions, 5 round worms, and much foul-smelling gas per rectum. On the 6th day morning the hiccough stopped and his abdomen became normal. His convalescence was uneventful thereafter.

I presume that his extreme thirst and pain in the abdomen were due to the hiccoughs which were probably produced by the presence of a round worm in the delicate and sensitive stomach. It becomes therefore necessary to have a microscopical examination of the fæces of all surgical cases of the gastro-intestinal tract. In mofussil hospitals which as a rule do not boast the possession of a microscope, administration of a little santonin with a little calomel, 2 or 3 days prior to the operation, will do no harm but may reduce, if not totally avoid, such undesirable complications as mentioned above.

A CASE OF TETANUS.

By S. B. MUKERJEE,
Civil Medical Officer, Kurseong.

R., HINDU MALE, aged 38, was brought to hospital about 6 days after the onset. He was a garden coolie, but his vocation was looking after pack ponies. He had an almost dried cut in his left middle finger. Lumbar puncture and intrathecal serum medication was at first refused. So a compromise was arrived at, namely, that if 48 hours of conservative treatment did not produce any improvement the above measure would be permitted, provided the patient did not get worse in the meantime. Intramuscular antitetanus serum 6,000 units, chloretone, bromide, ½ drachm each, every 4 hours after brisk purgation were started and repeated for the second 24 hours. Fortunately he could swallow though with great difficulty. No improvement having manifested itself intrathecal injection of 20,000 units of antitetanus serum (P. D. & Co., conc.) was given. Lumbar puncture did not show any hypertension and very little cerebrospinal fluid was withdrawn.

This was done under chloroform on 14th December, 1930; this was the only occasion when he became completely free of spasms. Encouraging improvement followed, and excepting the intramuscular injections other treatment was continued. Somewhat to expedite recovery and somewhat to please the insistence of the relatives; the intrathecal injection was repeated on 19th December, 1930 (10,000 units). Improvement continued and the patient was discharged on 23rd January, 1931. For about a week after the lumbar puncture, he complained of intense pain in his limbs. Three repeated intravenous injections of sodium iodide, grs. v. each, relieved him.

DEATH FROM A SNAKE BITE (KRAIT POISONING).

By K. G. GHARPUREY,
LIEUTENANT-COLONEL, I.M.S.,
Civil Surgeon, Ahmednagar.

A BOY, aged about 8 years, was bitten by a snake at 7-15 p.m. on the 30th December, 1930, on the right middle finger, at a place about 25 miles from Ahmednagar. The medical officer who saw him within 15 minutes of the bite could make out clearly two punctures on the palmar surface of the finger, one on the middle and one on the distal phalanx. A ligature was applied by the medical officer at the root of the finger. Both the punctures were cut deeply and were squeezed. Bleeding from the cuts was encouraged by unfastening the ligature. The wounds were packed with potash permanganate. Antivenene was injected and also injections of adrenalin and pituitrin were given. When the medical officer saw the boy 15 minutes after the bite the boy was fully conscious with staring eyes. Soon after he had one vomit and gradually he began to get drowsy. He could be roused and answered questions until 10-30 p.m. There was no paralysis of the legs and he could move his legs when asked to. At 10-30 p.m. he wanted to spit but could only bring out with great difficulty some ropy saliva. There were no hæmorrhages but the respirations were slowing. At 11-15 p.m. the respirations were failing and he could not be roused at all. He died at 12-30 a.m. within 5½ hours of the bite.

The snake was killed on the spot after the bite. It was sent to me and found to be *Bungarus coeruleus* or the common krait, 2 feet and 9 inches long. The identification was confirmed by the Bombay Natural History Society.

My thanks are due to the medical officer who supplied the notes of this case. It is a pity there is no antivenene specific for krait venom.

NOVASUROL IN THE TREATMENT OF ASCITES.

By R. C. MAJUMDER, M.B.,
Late Medical Officer, Nashipur Raj, Bhanga, Faridpur.

Case 1.—A Hindu lady, aged about 40, multipara, was suffering from ascites during pregnancy in February 1930. Delivery was normal with a living child, but the child died after 2 or 3 days.

She suffered from liver complaints for more than 6 years; about one year ago there was a little collection of fluid in the peritoneal cavity, but she was then cured by Kaviraji medicine. This time the abdomen was much swollen with fluid; the legs were œdematous and I was called to tap the patient by the sub-assistant surgeon of Nagarkanda Charitable Dispensary 20 days after delivery. I found ascites with enlarged liver; albumin was not present in the urine; the heart and lungs were normal.

I advised injections of Novasurol intramuscularly twice a week beginning from 0.5 c.c. with 20 grains of ammonium chloride by the mouth three times a day.

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I omitted rice from the diet for a week. The patient was completely cured by 8 injections. I have kept the patient under my observation up to now; she is quite well.

Case 2.—A Hindu lady, aged about 45, multipara, suffered from ascites with enlarged liver and diarrhœa. The patient came under my treatment in January 1930. Her urine was much reduced; albumin was present in traces. I advised the attending physician to inject Novasurol intramuscularly twice a week beginning from 0.5 c.c.

I prescribed mistura bismuthi et pepsini co. (without opium)—ʒi, extract punarnava, liquid—ʒi, ammonium chloride—gr. 20, and digifortis (P. D.)—m. 10. The patient made an uneventful recovery. She is now leading an active life.

Case 3.—A Mahommedan lady, aged about 32, was suffering from ascites, œdema of the legs, slight fever, diarrhœa and dysentery, enlarged liver for 6 months after delivery. I was called to consult about the case in March 1930. She was extremely anæmic. Albumin was present in the urine in traces. It required only 6 injections of Novasurol to cure the patient. I did not advise injections of emetine, as it sometimes increases œdema. I prescribed the same mixture as in the previous case with the addition of urotropine (Schering). I also prescribed Livadex for the anæmia after the disappearance of the ascites and other complaints.

Case 4.—A Hindu male, aged about 80, was suffering from dysentery from September 1929. There was general anasarca, ascites and scanty urine. The patient was treated first by Kavirajis without any satisfactory result. I was called to consult about the case and found him with extreme jaundice, enlarged liver, œdema of the whole body; the lungs were a little congested and a murmur was present at the apex of the heart; albumin was not present in the urine. Two injections 0.5 c.c. each of Novasurol were given. The anasarca and ascites almost disappeared, but the patient suddenly died of heart failure.

There are still four more such cases being treated under my direction with Novasurol. They are gradually improving.

From these cases I am of opinion that Novasurol is more valuable in producing diuresis than the ordinary diuretics.

In my opinion Novasurol is much better than "Swarna patpaty," a chemical preparation of mercury in Ayurvedic medicine, a so-called specific for ascites and general anasarca with chronic intestinal disorder, which requires strict restriction of intake of fluid and diet. Novasurol and ammonium chloride treatment do not seem to require so much restriction of intake of fluid and diet. The result of this treatment is encouraging at least in relieving œdema and ascites due to portal congestion and the effect seems to be permanent.

A CASE OF STRANGULATED HERNIA WITH REDUCTION *EN BLOC*.

By J. J. F. DUNN, M.R.C.S., L.R.C.P., I.M.D.,
Medical Officer, N.-W. Railway Hospital, Zind.

H. S., A HINDU MALE, aged 49 years, a railway employee, was admitted to hospital with the following history:—He had suffered from right inguinal hernia for the past 12 years. The day before admission, while straining at stool, the hernia descended, causing him most acute pain. As he was unable to reduce it himself, his wife and eldest son, a boy aged 17 years, took turns over a period of several hours in standing on his abdomen in order to give him relief. This not having any effect, a neighbour was called in who after using considerable force reduced the swelling. The pain, instead of diminishing, as he had expected, increased in intensity finally compelling him to seek medical aid.

Condition on admission.—There was no swelling in the right inguinal canal. A well-defined and acutely tender swelling was present in the lower part of the right iliac region. There was no muscular rigidity. He complained of intense abdominal pain, most marked at the umbilicus. Vomiting and hiccough were present. No stool or flatus had been passed since the hernia had descended.

Immediate operation was proposed, but was refused by him.

During the next three days the symptoms of obstruction became more marked, but he still refused operation. On the morning of the third day after admission, he insisted on leaving hospital and going elsewhere for treatment, but was brought back at night by a relative. He had, however, managed to obtain a purgative in the interval which considerably increased his sufferings. Vomiting was now fæcal, the abdomen markedly distended, and the tenderness of the iliac swelling much less.

Next morning, yielding to the pleadings of his relatives, he permitted operation.

On opening the abdomen, the iliac swelling was found to consist of the complete hernial sac containing the cæcum with the appendix, and the terminal four inches of the ileum. The cæcum and appendix had not suffered any appreciable damage, but the affected portion of the ileum was considerably congested.

He passed flatus four hours after the operation, and two stools the following night. The vomiting and hiccough continued in diminishing degree for another two days, but thereafter his convalescence was uneventful.

I am indebted to Dr. R. V. Clayton, Chief Medical and Health Officer, N.-W. Railway, for permission to publish the notes on this case.

USE OF THYMOL IODIDE IN INTERSTITIAL KERATITIS.

By PRAKASH CHANDRA GUPTA, M.B., B.S.,
Sathan Street, Lahore.

THYMOL iodide is a compound of iodine and and thymol, sometimes called "Aristol," but more correctly dithymol diiodide. It was introduced into medicine for the purpose of acting as a substitute for iodoform. It should be kept in amber-coloured phials to protect it from light. Its colour varies from that of chocolate to reddish-yellow. This medicine is being sold in the market under the trade name Aristol (Bayer).

So far I have not read in any textbook of ophthalmology that thymol iodide is of marked value in interstitial keratitis when dusted into the eye each day, and I think it is not used for this complaint in any of the eye clinics in Northern India. The following case will serve as an illustration:—

A girl, R., aged nine years (suffering from congenital syphilis), suffered from redness in the right eye in June 1929. She came under the treatment of an assistant surgeon, and was cured in about a month's time; she was treated as a case of trachoma. A sector-shaped opacity was left in the right eye.

In 1930 about the middle of June she again suffered from redness in the left eye with no ulcer of the cornea, but after a week she developed a slight sector-shaped haziness of the cornea; ciliary injection and photophobia were well marked.

On examination the father of the girl was asked for a syphilitic history, and he told me that the girl had been given grey powder from her birth and he himself took 10 drops of Donovan's solution daily. The girl was advised grey powder by some assistant surgeon, because she developed syphilitic rashes over her body and showed other signs of syphilis. The girl at this age shows no external signs of congenital syphilis.

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The parents of the girl were asked to get her blood examined by the Wassermann reaction but they refused. The patient was put on potassium iodide, gr. 3, thrice daily and on grey powder.

To start with she was given a purgative and locally atropine, 1 per cent. solution, was put into her eyes twice daily and smoked glasses were ordered. Application of leeches to the temple was advised but the parents of the girl refused.

She was given one injection of neo-salvarsan intravenously. Further injections of neo-salvarsan were not given in spite of my repeated requests. So she was treated with atropine, hot fomentations locally and potassium iodide with grey powder were given internally. For about a month she was thus treated after which potassium iodide was stopped, but instead of showing any improvement, nearly the whole cornea developed the haziness so typically found in interstitial keratitis, and keratitis punctata could be seen at the back of the cornea. The right eye also began to show signs of interstitial keratitis, but to a lesser degree as compared with the left eye.

Now the girl was put on cod-liver oil, and the injections were again suggested. This time I thought of giving myosalvarsan injections intramuscularly.

I happened to turn over the pages of Hare's *Manual of Therapeutics,* and read the chapter on thymol iodide. There it was mentioned that thymol iodide is of marked value in interstitial keratitis. The first introductory paragraph has been copied from this book. I procured this drug from the bazaar, and began to dust it into her eyes every day in the morning and gave only two injections of myosalvarsan. Further injections were entirely refused by her parents and they also stopped the use of potassium iodide, probably because of the cost. So I was left to treat her only with atropine and thymol iodide locally, and grey powder internally.

Four days after the use of thymol iodide she began to show improvement in her eyes. The use of atropine was stopped as the pupils were fully dilated and it had been put in her eyes for about a month. But atropine was again put in whenever the pupils showed a tendency to contract.

Thymol iodide was dusted into her eyes regularly for two months. To my surprise keratitis punctata disappeared from the back of the cornea because of the use of atropine, the haziness of the cornea entirely disappeared in both eyes, and the opacity in the right eye, which had been there since 1929, also disappeared. The pupils contracted to their normal size, and there was no reduction in her vision.

After this all treatment was stopped. A month later she again consulted me for a slight redness in her left eye. Atropine was put in once only, and thymol iodide dusted for 3 or 4 days.

The patient is a neighbour of mine. She has never complained of any further trouble, and goes to school.

The chief fact to which I want to draw the attention of medical men is the remarkable manner in which the opacity of the cornea disappeared. Obviously the cure cannot be attributed to potassium iodide, or myosalvarsan, and grey powder had been given her from her infancy. Moreover, when this drug was dusted into the eye it never caused any appreciable redness.

A CASE OF COMPLETE BILATERAL CLEFT PALATE.

By RASIK BEHARI LAL,
Medical Officer, Palia District, Kheri.

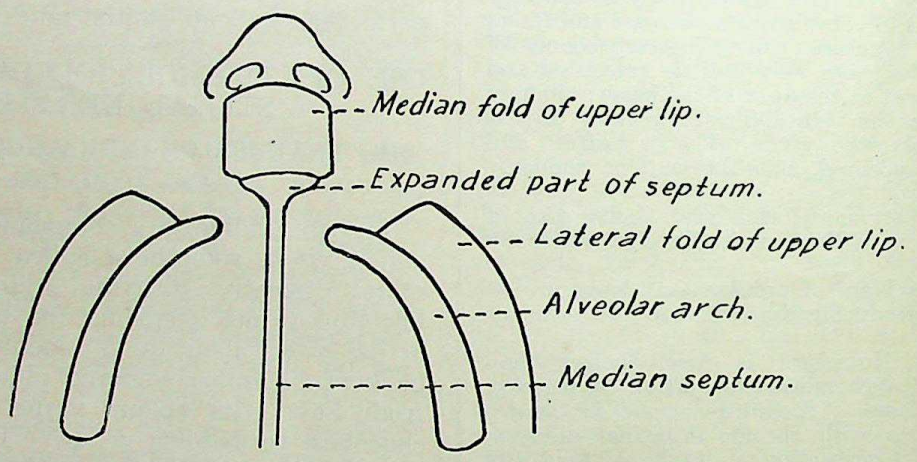
A FEMALE CHILD, 25 days old, was brought to me for operative treatment for the following conditions:—

The upper lip was divided into three parts by two notches extending right up to the alæ nasi. The middle part was almost quadrilateral in shape and half an inch wide with rounded ends on the free side.

The lateral parts had similar rounded ends and were well retracted outwards so that both the notches were not less than three quarters of an inch wide.

The middle portion was about half an inch anterior to the line of the lateral parts, supported on the medial septum described below and partially obstructing the nostrils.

The palatine processes of the superior maxillary bones and the palatine bones together with the soft palate were all absent. The alveolar arches stood well defined on both sides being absent in the middle part corresponding with the site of the harelip.



In the middle was seen the vomer dividing the roof of the mouth into two. The lower margin of this septum was hardly ¼ inch thick. This septum extended forwards beyond the alveolar line up to the nasal fold of the upper lip noted above; here it had expanded to about ½ inch.

One could see the two nasal cavities, as two hollow domes, through the mouth. Even the roof of the nasal cavities was perfectly visible from the mouth.

Besides this there was no other defect in the body of the child, who at the time looked quite healthy, though weak in constitution, as most Indian babies are.

She was being fed artificially, as she could not press the nipple.

I did not think that the baby would survive long and so I told the guardians to wait for the operation till the baby was at least 6 weeks old.

Parents.—Both mother and father are healthy except that the latter had lost one of his eyes through smallpox.

The child died just as she was nearing her sixth week.

Remarks.—Bilateral cleft palate with total absence of the arch is not described in text-books and cannot be closed by any operation.

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Indian Medical Gazette.

MAY.

THE REAL PROBLEM IN INDIA.

A PROBLEM in India which should be faced immediately, and will certainly have to be faced in the very near future, is that of the balance of population and food supply. Until comparatively recent times this balance has been maintained by war, disease and sudden famine. By the maintenance of an efficient army war has been abolished, by irrigation and civil organisation famines have been reduced to a negligible factor, whilst medical research and its application are now beginning to have a serious effect on the disease incidence and mortality rates throughout the length and breadth of the peninsula. Previous census returns show that the population of India has increased by a hundred millions since the British occupation, and the first returns from the present census indicate that there has been an even greater increase during the last decade. Bengal shows a 7 per cent. increase; there is every prospect that this rate will be increased, but even if it is maintained, a little arithmetic and less imagination are required to forecast the state of affairs one hundred years hence. At the present day the produce of the land does not maintain the population in an efficient state of nutrition: how will it maintain twice the present population ?

We are justified in claiming that canals, railways and improved methods of agriculture have made it possible for 300 millions odd of people to live in a better economic condition than did the much smaller population of a hundred years ago. At present we are aiming at an increasing birth rate and a falling death rate, heedless of the fact that we are rapidly bringing about a critical state of affairs. Unless something is done to restore the balance between population and food, Nature will most certainly step in with her time-honoured machinery of starvation and disease; and medical science is powerless in the face of disease in the starved body. Nature's methods are frequently ruthless and they are never the most economical. The victims of epidemics are not only newly-born babies and decrepit old men and women, but strong healthy men with large families to support and adolescents on whose education large sums of money have been spent. Looking at the problem from this point of view it would appear to be the proper course to shut down all activities which tend to preserve the life of the newly-born child. From an economic point of view it would appear to be better for the child to die as an infant on whom no money has been spent than some time later after he has been fed and educated for a number of years without any return. Even from a humanitarian point of view the rapid, painless death of the newly-born seems preferable to a long-drawn-out and possibly painful death at a later age. Such a retrograde step is, however, unthinkable. Furthermore, there is another aspect to the antenatal care and infant welfare movement; it is not only a question of preservation of life but of producing healthier and stronger babies who will grow into healthier and stronger men.

The position can best be understood by taking a concrete example which gives a true picture of what happens to the vast majority of the masses in this country; if it errs at all it errs on the optimistic side:—A man is earning Rs. 15 a month; before he reaches the age of 30 his wife has given birth to six infants; three of these die before they reach the age of 5 years. The surviving three cannot be regarded as having a brilliant prospect, their diet is far from sufficient and their education is of the most nominal kind. The philanthropists now step in, they are appalled by the high infant mortality, they organize mother and infant welfare centres and if they are really successful they save two of the babies which would have died. Now the unfortunate parents have to feed and clothe five children instead of three, with the inevitable result that their chances of making a reasonable start in life are much worse than before.

A contributor, an officer in a high administrative position, who has written to us on this subject and from whose paper we are quoting freely, gives the following illustration which, on this occasion, we are giving in his own words:—"A few days ago this point of view was brought home to me very forcibly: I was visiting an excellent maternity hospital where the doctor and matron pointed with pride to premature twins who had just been born. I cannot forget the look of despair on the face of the mother; for her the survival of these additional unwanted babies was a real tragedy."

Other countries have been able to abolish epidemics and to lower the infant mortality without causing a crisis of this kind. In the Free State of Ireland this is done by delayed marriage; the average age at which men marry is about 40. In other western countries birth control measures are the methods of choice: these can be carried too far as in the case in France, but we have a long way to go in India before we need begin to worry about the danger of "race suicide."

It is quite obvious that there is no hope for real improvement in the condition of the people of India unless they acquire a rational outlook on life.

It is easy to realize the vast difference which exists between the outlooks of eastern and

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western peoples if we picture to ourselves an English boy of 16 announcing to his parents that he is contemplating marriage: he would certainly be regarded as having taken leave of his senses.

In India the boy of 16 usually finds that a marriage has already been arranged for him, if indeed he is not already married. In the western countries the young men and women are made to realize that they are responsible for arranging their lives in such a way that they shall have satisfactory existences; there is no need to instil this outlook on life into them in the schools: they acquire it unconsciously in their family environment.

The traditional matrimonial customs of the East originated in ancient times when there was a heavy mortality from war, disease, and famine so that the best hope of perpetuating a family was by having as many children as possible, as early as possible. Under modern conditions these customs have ceased to be useful to the community, on the contrary they are entirely opposed to the well-being of the people.

We are inclined to think that social and religious customs in India are adhered to with such tenacity that it is useless to contend against them, but there is plenty of evidence that this is not the case. The wide support for the Sarda Act was an indication of the trend of educated Indian opinion, the introduction of birth control clinics by the Government of Mysore is another sign of the times, everywhere there is a growing consciousness of the evils which result from excessively large families.

It is not necessary for us to advocate any special system of limiting the families; all that is needed is to educate the people in the true facts of the economic situation and leave them to decide for themselves as to which line of action is acceptable to them. Several Indian gentlemen of high standing and intelligence have assured us that it is useless to advocate continence or delayed marriage; they regard birth control as the only practicable solution.

In Madras there is actually a "neo-Malthusian League" which is organized by two of the most cultured and respected men of the city. But it is not our business to dictate methods, our responsibility ends when we have educated the people in the hard facts of existence. We can leave them to decide on a line of action for themselves.

As matters stand at present, India is heading for a great disaster, things can be improved to some extent by improved agriculture, by emigration, by the abolition of such wasteful customs as maintaining millions of useless cattle and the burying of gold. We can also do something to increase physical efficiency by controlling malaria and other debilitating diseases and so bring about greater productivity. All these remedies are merely palliative and temporary; they will enable us to maintain the present population in a better condition, but the numbers of the people will inevitably increase to the limits imposed by the food supply unless the people secure a new outlook on life.

The remedy then lies in a rational form of education: this must be directed definitely to teaching the children how to face the battle of existence with a prospect of success.

The task is by no means easy, but we must face it. If we take the view that the problem is insoluble and make no effort to solve it, we shall certainly fail. On the other hand, if we tackle it with energy and intelligence and then fail we shall at any rate be able to face our critics who accuse us of having allowed a deplorable state of affairs to continue without making any serious effort to find a remedy.

The best chance of success is to create still another Commission whose members will examine the situation with breadth of vision. They must be men of outstanding ability such as have been found for the Commissions which have examined the constitutional position, the needs of agriculture, and the conditions of labour in India. This Commission will start with the great advantage of having the reports of its predecessors: these deal exhaustively with several aspects of the wider problem. Experts should be employed to help, but they must not be allowed to dominate the Commission. The problem is really one of devising a rational system of education, but we must refuse to allow the educationalists to dictate to us. Education has failed in the past, public health has failed, social reform has failed, politics and economics have failed; agriculture has failed.

Experts must necessarily view the situation from their own narrow angle of vision. The problem is many-sided and it must be examined from the broadest possible point of view.

The terms of reference might be:—

> "To enquire into the causes of the unsatisfactory economic and physical condition of the people of India and to recommend measures for their improvement."

India is a very sick man, all sorts of diagnoses have been made and all sorts of remedies have been advocated.

What is needed is to have a consultation by the best available brains of Great Britain and India, then we may hope to form accurate views as to the nature of the malady, its causes and the best means of restoring the patient to health. This consultation in itself will prepare the way for the adoption of the proper remedies. Even if any one man were able to put his finger on the diseased spot and prescribe a suitable treatment this would not be enough: it is essential that the people of India

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should be brought to realize for themselves the nature of the disease and should come to a general agreement as to the proper remedies.

Let us refer to a resolution which was passed unanimously by four successive conferences of medical research workers in India, this shows that the medical men have been the first to realize that their efforts in themselves are doomed to failure.

"That this Conference believes that the average number of deaths resulting every year from preventible diseases is about five to six millions, that the average number of days lost to labour by each person in India from preventible diseases is not less than a fortnight to three weeks in each year, that the percentage loss of efficiency of the average person in India from preventible malnutrition and disease is not less than 20 per cent., and that the percentage of infants born in India who reach a wage-earning age is about 50 per cent., whereas it is quite possible to raise this percentage to 80 to 90 per cent. The Conference believes that these estimates are understatements rather than exaggerations, but allowing for the greatest possible margin of error it is absolutely certain that the wastage of life and efficiency which result from preventible disease costs India several hundreds of crores of rupees each year. Added to this is the great suffering which affects many millions of people every year.

This Conference believes that it is possible to prevent a great proportion of this waste at a cost which is small in comparison with the expenditure.

The recent census shows that the position in India is one of grave emergency. The Conference recognises that the problem is very complicated and involves not merely medical research, but also questions of public health, medical relief, medical education, propaganda, and social and economical considerations.

The Conference strongly urges on Government the immediate necessity for appointing a strong commission, chiefly non-technical, for the purpose of making a thorough enquiry into the wastage of life which results from causes which are capable of being remedied.

The Conference believes that the greatest cause of poverty and financial stringency in India is loss of efficiency resulting from preventible disease and therefore considers that lack of funds, far from being a reason for postponing the enquiry, is a strong reason for immediate investigation of the question."

Disease prevention and health education form essential parts of the programme, but they are only parts: they are capable of effecting a revolution in the physical condition of the people, but only if the other aspects of the problem are tackled at the same time.

Special Articles.

THE LABORATORY DIAGNOSIS OF MALARIA.*

By R. KNOWLES,

LIEUTENANT-COLONEL, I.M.S.,

Professor of Protozoology, Calcutta School of Tropical Medicine.

WHEN the Secretary asked me to prepare something for this meeting, I offered him the choice between a paper on the historical aspects of the treatment of malaria, and a clinical demonstration on laboratory methods in the diagnosis of malaria. He chose the latter. The subject may seem a most elementary one, but almost every day of the week I receive letters from all over India asking for information with regard to it. Correspondents write, "I cannot get Leishman's stain to work in the *mofussil*. Why is this?" Or, "Please give me details of the method of diagnosis of malaria by culture." Or, "Must the water used in Romanowsky staining be distilled; will not tap water do?" Now I think that any surgeon will admit that his success in surgery depends upon the most meticulous attention to details of technique, and the same is true of all laboratory procedures.

In order not to take up too much of your time, Dr. B. M. Das Gupta has kindly consented to demonstrate the various procedures concerned, as I describe them; whilst in my department next door we have got out a demonstration showing the complete life cycle in man of *Plasmodium falciparum* as seen in Bass' culture. The latter illustrates such points as that the early gametocytes of this species are spherical bodies, and that they only become crescentic in shape as they reach maturity and pass into the peripheral circulation; the very marked development of black hæmozoin in all developing forms—usually in the form of a condensed eccentric cluster; and the mature schizont rosettes of this species, which fill the whole of the erythrocyte and contain approximately 22 merozoites.

There are four procedures here to be considered, and they are:—

(*i*) The preparation, staining and examination of thin blood films.

(*ii*) The preparation, staining and examination of thick blood films.

(*iii*) The use of thin and thick blood films on the same slide.

(*iv*) The diagnosis of malaria by cultural methods.

Before proceeding further, let me emphasise the utmost importance of using only perfectly clean and well polished slides in making films. Frosted slides, scratched slides—such as medical storekeepers delight to supply—are useless. If you entrust the cleaning of old used slides to the laboratory sweeper, he will sit down on the floor with a bowl of water and a supply of *saji mutti* (crude carbonate of soda), and scrub the slides clean. This ruins their surface, as it scratches them; it should never be permitted. The simplest way of cleaning old slides is to boil them for some hours in an emulsion of country soap or soft soap in water; they must then be *very* thoroughly washed in running tap water for some hours to remove all trace of alkali; then stored in rectified spirit in a glass jar with a ground glass stoppered lid. Before use they are removed from the spirit, polished with a clean, old, much washed cotton handkerchief, and four or five are laid flat on a clean piece of paper by the patient's bedside.

Thin Blood Films.

It is important to select the spreader with care. The best spreader is a glass slide with a smooth, even end,

* Being an address delivered to the Calcutta Branch of the British Medical Association on Friday, the 13th February, 1931.

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as tested by running it across the ball of the thumb. Or a hypodermic needle may be used instead. In using the spreader do not pick it up by the ends, as this may deposit dirt from the operator's fingers on the spreading edge, but hold it by the sides. As a pricker, I always use a clean, sterilised hypodermic needle; or a surgical needle may be used, or Wright's glass pricker, made by drawing out in the flame a capillary glass tube and breaking off the end. It is not usually necessary to mop up the patient's skin with alcohol and iodine, but it *is* necessary to flame the needle. Boyd (1930) in his *Introduction to Malariology* says that it is better to take the blood from the lobe of the patient's ear, as patients may sometimes faint when the finger is pricked; all that I can say is that in 26 years' experience of pricking patients' fingers, I have never known a patient to faint. Do not prick the pulp of the finger, as this is painful, or the lateral aspect by the side of the nail. Select instead the dorsal aspect just below the root of the nail. If, as often happens in malaria, the patient is perspiring profusely, it may be necessary to cleanse and dry this part with a cotton-wool swab soaked in spirit. If the patient is very anæmic, make him forcibly flex the fingers on to the palm of the hand; this will ensure getting a good supply of blood. In extremely anæmic subjects it may be necessary to apply a tourniquet, especially if thick films are also wanted. Thin rubber pressure tubing is the best form of tourniquet to apply.

Having pricked the finger with a short deep stab, take the clean slides from the paper one by one, invert them, and bring the slide just into contact with the issuing blood. This gives a small—not large—drop of blood about half an inch from the end of the slide. Apply the spreader at an angle of 45 degrees; wait until the blood runs by capillary attraction between the spreader and the slide, and then draw the film. It is very important that the blood should follow the spreader, and that the spreader shall not push the blood in front of it (*vide* Fig. 1).

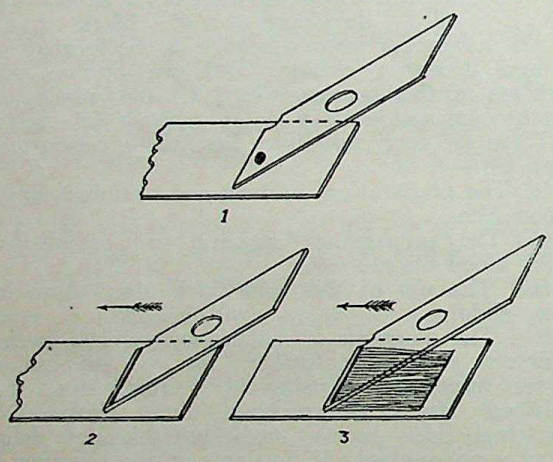

Fig. 1.—Preparation of the Thin Blood Film.

If the blood is pushed in front of the spreader, the spreader passes over the cells and greatly distorts the parasites. Even in a properly drawn film the very delicate hair-like rings of *P. falciparum* are liable to considerable distortion, whilst the delicate cytoplasmic bridges in the growing trophozoites of *P. vivax* may be broken, this giving rise to the appearance of detached blue staining masses of parasite cytoplasm within the erythrocyte.

The cigarette paper method of preparing films recommended in some books is not advisable; it may fill the film with paper fibres and other foreign bodies.

Four further points about the thin film. In extreme dry heat, e.g., in Iraq in the middle of the hot weather with atmospheric temperatures going up to 125°F., films taken in the middle of the day are apt to show considerable distortion of the parasites, and render the identification of species difficult; under such conditions it is best to take the films after sunset or in the early morning, except in cases of emergency. In intense wet heat, such as prevails in the Vizagapatam Agency Tracts in the rains, the instant that the film has been drawn it must be held over the flame of a spirit lamp to fix it; if this is not done the film becomes hæmolysed, thus rendering the identification of parasites difficult. In malaria survey work, method is essential. Each child in rotation should be given a number, his name entered in the roll opposite that number, the film numbered to correspond, and put into a vertical filing cabinet opposite the corresponding number. If a collection of blood films is being made in the field to be taken to a base laboratory to be stained subsequently, it is essential to fix the films at once, either by exposure for 3 minutes to methyl alcohol, or for 10 minutes to absolute alcohol. Staining may be deferred until the base is reached, but old unfixed films stain extremely badly. Further, in survey work, blood films must be protected from flies; flies are passionately fond of eating up blood films, and if you want to see what a contaminated blood film can look like, allow a fly to crawl over it and then stain and examine it; the film will be found full of bacteria, fungi, yeasts, extraneous protozoal cysts, and may even show helminthic ova.

The simplest method of labelling the film is to take a sharply pointed pencil or a needle and write the patient's name across the film, using the dried film as if it were a piece of frosted glass.

Films should neither be so scanty that they can hardly be seen, nor so thick that they look as if the doctor had used the slide to stem a profuse hæmorrhage.

Thick Blood Films.

It is extremely desirable in all cases to supplement the examination of the thin film by examination of a thick blood film. Again and again examination of thick films will detect parasites, where they are missed in the thin film. The only difficulty about thick films is that, if only ring forms are present, it is sometimes difficult to determine the species concerned. This, however, does not apply to growing trophozoites, schizonts, or gametocytes. Personally, I always examine both thin and thick films from every patient.

The best method of preparing the thick film is that advocated by James (1920). Inverting the clean slide bring it to just touch the drop of blood issuing from the finger, and take four small drops of blood on it at the corners of a half inch square. The drops should be small and not large. With a rounded needle next pool the four drops into an even thick film covering the half inch square. Puddling should be avoided, and the film must not be too thick. The procedure is illustrated in Fig. 2.

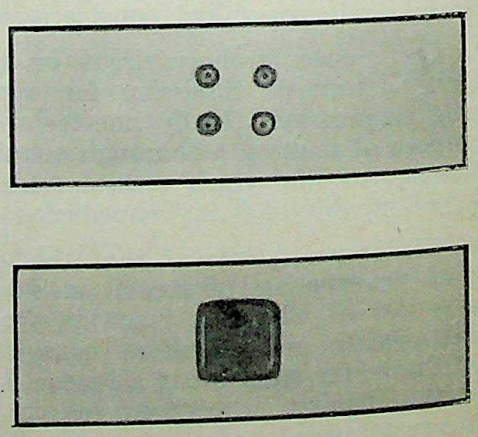

Fig. 2.—Preparation of the Thick Blood Film. (After James, 1920.)

Such a film takes two hours to dry at room temperature, or one hour in the 37°C. incubator. Drying can be hastened by leaving the film under a rapidly moving fan. If the film be taken at the patient's bedside, it is best to cover it (e.g., with a saucer) to keep it from

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contact with flies and dust, and to leave instructions that it be sent to the laboratory three hours later. If possible, it is best to take the thick film one day, and stain it the next.

Thin and Thick Films on the Same Slide.

This method is advocated by Sinton (1925) and it is of special value in survey work. A thin film is spread on two-thirds of the slide, and a thick film at the other end. A transverse line across the slide between the two films is drawn with a blue grease pencil (*vide* Fig. 3).

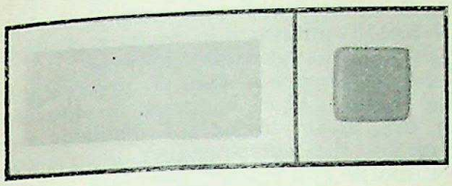

Fig. 3.—Thin and Thick Blood Films on the same slide. Sinton's method.

Sinton (1925) gives the following particulars with regard to the value of thick blood films as contrasted with thin ones in survey work:—

	P. vivax.		*P. falciparum.*	
	Thin films.	Thick films.	Thin films.	Thick films.
Parasites in 100 fields.	1	4	1	16
Parasites found in 2 minutes.	1	7.7	1	22
Time required to find parasites.	6.6	1	23	1

The Romanowsky Stains.

The stains universally employed for the staining of blood films are the Romanowsky ones. It is true that these stains probably do not give exactly true pictures of the parasites concerned, as they are not cytologically good stains. On the other hand, they have been so universally employed in all malaria work for thirty years that very few workers are familiar with the malaria parasites as stained by any other method. The principle upon which these stains depend is that medicinal (not pure) methylene blue contains a number of oxidation products, the most important of which is methylene azure. When watery or alcoholic solutions of medicinal methylene blue and of eosin are mixed together, a series of loosely combined chemical bodies are formed, such as methylene-blue eosinate, methylene-azure eosinate, etc. These different compounds possess different affinities for different cell structures, and thus differential staining results, although but a single stain is used. The red blood corpuscles stain a transparent pink or orange colour; the nuclei of leucocytes, shades of violet; eosinophile granules in the coarsely granular eosinophile leucocytes, red; neutrophile granules in the polymorphonuclear leucocytes, yellow to lilac; mast cell granules, deep violet; blood platelets, purple; the cytoplasm of malaria and other blood-inhabiting protozoa, a bright "Cambridge" blue, and their chromatin a bright ruby red.

I do not propose here to deal with the original Romanowsky method. I would like to mention, however, that Colonel Christophers is very fond of it. It is economic and very suitable for laboratories where large numbers of films have to be stained daily. In India, the two varieties of Romanowsky stains universally employed are Leishman's and Giemsa's stains, and we may deal with these in turn.

In using both Leishman's and Giemsa's stains it is *absolutely essential* to use distilled water of neutral or very faintly alkaline reaction to dilute the stain. It is precisely this point in all probability which gives laboratory workers in the *mofussil* so much trouble with Leishman's stain, and which leads to so many of them abandoning it in favour of fixation with methyl alcohol and staining with Giemsa's stain. Further, the distilled water must be perfectly fresh, for stale samples of distilled water are very apt to become contaminated with Bodo, fungi, yeasts, etc., which may get into the stained film from this source and confuse the worker. Fresh, doubly distilled water is the best.

If there is any doubt about the distilled water in use, proceed as follows:—

Place 5 c.c. of the distilled water in a test tube and add to it 5 drops of a 0.04 per cent. watery solution of bromo-cresol purple as indicator. If the water is faintly acid—as is usually the case—it will turn a pale yellow colour. In this case add very cautiously drop by drop a 1 in 1,000 watery solution of sodium carbonate. The water turns faintly alkaline and turns a purple-violet colour. At this point stop at once, and now use the water thus prepared for diluting the stain. (The faint trace of bromo-cresol purple present will not affect the staining.) Excess of soda solution must not be used.

With regard to washing the films after staining, ordinary tap water can usually be used. The Calcutta tap water always gives a definitely alkaline, purple, reaction with the bromo-cresol purple indicator.

Leishman's Stain.

This stain is invaluable, *if properly prepared and properly used.* It is both a combined fixative and stain, as it is made up with methyl alcohol. Its use, however, demands the most meticulous attention to details if good results are to be obtained. The ingredients used must be the very purest possible, Grübler's or Merck's powdered Leishman's stain, and Merck's methyl alcohol *purissimum,* free from any trace of acetone. Proceed as follows:—

Scrupulously clean a 150 c.c. ground glass stoppered bottle, a 100 c.c. graduated glass cylinder, and a glass (not porcelain) pestle and mortar. When they are absolutely clean give them a rinse out with pure methyl alcohol. Weigh out 0.15 gramme of the Leishman's powder, and measure out 100 c.c. of methyl alcohol *purissimum* in the graduated cylinder. Put the weighed out Leishman's powder in the glass mortar, add a little methyl alcohol from the cylinder, and grind. Pour the dissolved stain from this into the glass bottle. Add more methyl alcohol to the residue, grind again, and again pour the dissolved stain into the bottle. Repeat this again and again until every particle of the stain has gone into solution and the whole 100 c.c. of methyl alcohol have been used up. The most essential step in the procedure is to ensure absolutely complete solution of the stain. Next incubate the stain by placing it for 24 hours (or overnight, but not for longer than 24 hours) in the 37°C. incubator. Or the bottle may be placed in a warm, dark cupboard for this period. This ripens the stain and gives greatly improved staining results.

For use the stain should be poured into perfectly clean 30 c.c. drop bottles. The stock solution should be kept in a dark cupboard. As thus prepared, Leishman's stain will keep for at least a fortnight in the hot weather in Calcutta. For the general practitioner, who has only an occasional film to stain, the use of Burroughs Wellcome & Co.'s "Soloid" Romanowsky (Leishman's) stain may be recommended. If fresh, the "Soloids" give an admirable stain, but if old results are inferior; in fact one would like to recommend that the "Soloids" should be dated, as is done with sera and vaccines. To prepare the stain a drop bottle is made perfectly clean and then rinsed out with Merck's methyl alcohol *purissimum.* Three of the "Soloids," i.e., 0.045 gramme, are dropped into the bottle, and 30 c.c. of Merck's methyl alcohol *purissimum* added. The stopper is turned so that no fluid can escape from the bottle and complete solution of the "Soloids"

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brought about by shaking. It is advisable to incubate the bottle afterwards overnight in the 37°C. incubator.

To use Leishman's stain, proceed as follows:—

1. Lay the slide, blood film surface upwards, on a staining rack. A convenient way to make such a rack is to fix two pieces of glass tubing parallel with one another across a Petri dish or basin with plasticine. This answers very well where large numbers of films have to be stained, and avoids mess. The rack must be dead level.

2. Drop Leishman's stain from the drop bottle on to the film until its whole surface is covered. The methyl alcohol in the stain fixes the film. This takes half a minute only, and the readiest way to measure this interval of time is to count up to 25 slowly mentally. Less than half a minute fails to fix the slide, and to leave the stain on longer undiluted results in deposit of stain on the slide.

3. At the end of half a minute drop on to the slide double the corresponding number of drops of pure distilled water. (This distilled water should have been previously tested with bromo-cresol purple, as detailed above.) By tilting the Petri dish or the end of the slide allow the stain and water to mix thoroughly. Stain for about 10 to 15 minutes. Less than 15 minutes will not bring out stippling in the infected cells; whilst staining for more than 20 minutes is apt to result in deposit on the slide. If the stain has been properly prepared and diluted a thin golden scum will rise to the surface of the fluid.

4. Fill a bowl or beaker with water; this may be either distilled or tap water. Take the slide, still covered with the stain, and plunge it into the bowl of water so that the stain floods off. (Films stained by the Romanowsky methods should never have the stain drained off, as this is apt to result in deposit.)

5. Transfer to a small Petri dish full of water (distilled or tap). Rock the dish gently until the film, which is bluish-green, commences to turn pink. This takes about a minute or less. At this stage remove the slide from the Petri dish, and place it, film side downwards, leaning against a vertical wall or the vertical edge of the table, to dry. Films should never be blotted, as this is liable to introduce all sorts of foreign bodies.

In examining thin films for malaria parasites, a most useful lens is the 1/7th inch oil immersion "fluorite" objective. This gives very clear definition, a clear field, and with it one can cover ground rapidly. If a suspicious object be found, the 1/12th inch oil immersion objective may be substituted for the 1/7th inch or a higher eyepiece employed.

It is always good practice, before using the oil immersion objective, to glance through the film with the 1/6th inch dry objective to see that the nuclei of the leucocytes are deeply stained. If this is the case any malaria parasites present will presumably be well stained.

Methyl Alcohol Fixation and Giemsa's Stain.

This is preferred by many workers to Leishman's stain, as it is a method which is very free from deposit. Again, the materials used must be of unimpeachable quality. The methyl alcohol should be Merck's *purissimum,* free from any trace of acetone. The preparation of Giemsa's stain is troublesome, and for the ordinary laboratory worker it is best to purchase ready made up undiluted Giemsa's stain. The writer has always used that supplied by the Central Research Institute at Kasauli for many years, and has found it admirable. Ready made Giemsa's stain prepared by Grübler & Co. can also be purchased from the Scientific Supplies Co., College Street Market, Calcutta.

Methyl alcohol rapidly loses its fixative power in the wet tropics. This has been shown by Knowles and Senior-White (1930). A batch of blood films was taken from a patient suffering from benign tertian malaria one day during September, and kept in a desiccator. A phial of Merck's methyl alcohol *purissimum* was opened and was kept on the laboratory bench. Each day films were taken from the batch in the desiccator, were fixed with the same opened specimen of methyl alcohol, and were stained with the same brew of Giemsa's stain. On the 1st and 2nd days the films stained perfectly. On the 3rd day the staining was fairly satisfactory, but it failed to bring out Schüffner's dots. On the 6th day the staining had become weak. On the 7th day and later it was hopeless; on the 10th day the parasites failed to take the stain at all, and only pigment could be seen. The moral of this is that methyl alcohol *purissimum* for use in the wet tropics should be put up in small, 5 c.c., phials, as the contents of the phial can only be relied upon for 5 or 6 days.

To use Giemsa's stain:—

1. First fix the film. This can be done by covering it for 3 to 5 minutes with pure methyl alcohol, or by dipping it for 10 minutes into ordinary absolute ethyl alcohol. Then wash thoroughly in water.

2. Dilute the Giemsa's stain, 1 part with 14 parts of distilled water. This is most readily done by measuring out 10 or 15 c.c. of distilled water and dropping into it the corresponding number of drops from a drop bottle of the undiluted stain. The distilled water must be absolutely neutral or on the very faintly alkaline side of neutrality as tested by the bromo-cresol purple indicator as detailed above.

3. Place the slide film surface upwards in a Petri dish, and flood with the stain. Stain for half an hour or longer. The more dilute the stain and the longer it is allowed to act, the better the result. The stain may be made more dilute, the Petri dish covered to keep dust out, and the film stained overnight or for 12 to 18 hours.

4. As soon as the slide is stained, remove it from the Petri dish, plunge it into a beaker full of tap water to flood off the stain. Then soak in a bath of fresh distilled (or tap) water in a Petri dish until the film begins to turn from a bluish-green to a pink colour. At this stage remove the slide and place it to dry by leaning it, film side downwards, against a vertical surface. Do not blot.

The Combined Use of Leishman's and Giemsa's Stains.

This gives admirable results. The procedure is as follows:—

1. Place the slide, film surface upwards, on a staining rack. Cover it with undiluted Leishman's stain for 30 seconds.

2. Dilute the Leishman's stain with double the quantity of diluted Giemsa's stain (one drop to each c.c.). Mix thoroughly.

3. Stain for 15 minutes or so. Then flood off the stain as in Leishman's method and differentiate as usual in a Petri dish of water.

Shute's Stain.

This method is given by S. P. James (1929), and is of special value in bringing out stippling in the infected red blood corpuscles. Details are as follows:—

"The stain is made with pure methyl alcohol ('free from acetone') and crystals of Leishman's stain. The reaction of the methyl alcohol must be tested before making up the stain. This is done with the aid of an outfit for determining the hydrogen ion concentration, the indicator used being phenol red, and the range of standard tubes being from pH 6.6 to pH 8.0 (Baird & Tatlock's outfit No. P. 2759). Into the test tube made of cordite glass which is supplied with the outfit, pipette 5 c.c. of the methyl alcohol to be tested. With a separate pipette add 0.5 c.c. of a 0.01 per cent. solution of phenol red. Shake, and after a moment or two, compare the tint with that in the standard tubes provided. Every brand of methyl alcohol which we have tested in this way gives a slightly acid reaction. After adding the indicator to 5 c.c. of the brand which we use, the tint corresponds nearly always with that of the standard tube marked 6.8, but sometimes with that marked 6.6. It is our practice to discard supplies of methyl alcohol which are as acid as is indicated by the tube marked 6.6, and we have had to do so even with some supplies which makers put up in hermetically sealed tubes 'for use in microscopic staining.'"

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"To make up the stain, rinse a glass stoppered bottle* thoroughly with some of the methyl alcohol that will be used for the stain, and then put in 0.15 gramme of Leishman's crystals (usually called 'Leishman's powder'). Add 100 c.c. of the methyl alcohol. Shake from time to time during the next 24 hours, after which period nearly all the crystals will be dissolved, and the stain will be ready for use. For several reasons it is unwise to make the solution in a pestle and mortar, or to filter it, as is usually recommended in the text-books."

"Next deal with the distilled water which will be used in the staining process and for washing the stained slides. We work with a 1-litre flask of distilled water which has been treated as follows: Shake up the water in the flask and wash out a 5 c.c. pipette with water from it; test 5 c.c. of the water in the same way as was described for testing the methyl alcohol. Probably the water will be found to be at least as acid as is indicated by the standard tube marked 6.6. Add to the water three or four drops of a saturated filtered solution of lithium carbonate, shake the flask to ensure thorough mixing, and repeat the test. Continue the procedure of adding one or two drops of the lithium carbonate solution and of testing until the water in the flask becomes exactly of an alkalinity indicated by observing that, after adding 0.5 c.c. of the phenol red solution to 5 c.c. of the water, the resulting colour matches the colour of the solution in the standard tube marked 7.2. This is the degree of alkalinity that must be reached when the methyl alcohol is of an acidity represented by the tube marked 6.8."

"To stain a blood film, drop four drops of the staining solution on the film, rock for ten seconds, add twelve drops of the distilled water, and mix thoroughly by tilting and rocking. We do not use a glass rod for mixing the water and the stain on the slide, because a rod often carries specks of dust or of cotton fibre which are transferred to the slide; but a good deal of practice in tilting and rocking the slide is required in order to obtain quick and complete mixing of the water and the stain without spilling some of it off the slide, or on the fingers, and without allowing any of the stain to dry on the film before the water has reached it. Nor do we employ the usual practice of making a barrier with a wax pencil across the proximal end of the slide, because, when this is done, particles of methylene blue from the pencil invariably become mixed with the stain and alter the result. By using four drops of stain and twelve drops of water, the stain is diluted three times, which, we think, gives the best results. Four drops of stain, carefully applied, are quite sufficient to cover a film and, when twelve drops of water are added, the amount of fluid on the slide is easy to manipulate so that none spills off the slide or reaches the fingers. We time the ten seconds during which the stain alone is on the film by a watch with a large second hand."

For routine work the film should be stained for 30 minutes, but in cases of infection with *P. malariæ* a period of 45 minutes is desirable to bring out the very fine Ziemann's stippling in the infected cells.

"On the termination of staining, the stain must not be poured off the slide before beginning to wash the film; a good stream of distilled water must be applied at once so that all the stain and deposit is flushed off in the first moment. Washing in the stream of distilled water should be continued for fifteen seconds by the watch."

We have used Shute's stain a good deal since Col. James' paper appeared. It is an admirable method of demonstrating stippling in the infected cells, but both the chromatin and cytoplasm of malaria parasites stain so deeply by it that it is sometimes difficult to identify the various parasite stages seen. For routine diagnostic work we prefer the combined use of Leishman's and Giemsa's stain as detailed above.

*The bottle should be of hard glass (green glass).

Difficulties with Thin Stained Films.

1. *Deposit.*—This is probably the commonest difficulty with Leishman's stain. It is especially apt to occur if the film has been stained too long, or if too long an interval has been allowed to elapse before diluting the stain with distilled water. To remove deposit from a stained film, first remove the cedar wood oil from the slide with xylol. Next let the film dry completely. Flush the slide—for an instant or two only—with rectified spirit and instantly immerse the slide in distilled water to remove the alcohol. The flushing with spirit must be practically instantaneous.

The use of a rocker upon which to rest the slide whilst staining will prevent the formation of deposit. There are several such patterns of rocker on the market, or a home made one can easily be made.

2. *Staining too blue.*—After removing the cedar wood oil, as above, immerse the slide for a few seconds (only) in 1 in 5,000 acetic acid in water, then immediately transfer to distilled water.

3. *Staining too weak.*—If the batch of stain used is giving weak results, deeper staining can often be obtained by the use of 1 in 2,000 watery potassium carbonate solution to dilute the stain with, instead of distilled water.

4. *Permanent preparations.*—Films stained by any of the Romanowsky stains as a rule fade very rapidly, the first thing to disappear in old stained slides being the stippling in the red corpuscles. In order to make permanent preparations several writers recommend taking the stained film up through the graded alcohols to xylol and mounting in "neutral" Canada balsam. The writer has never had any success with this method, since however rapidly one passes through the alcohols a great deal of the stain is dissolved out, whilst he has never yet seen a truly neutral solution of Canada balsam. A much better—although crude—method is to let the stained film dry completely in the 37°C. incubator, and then cover it either with "Euparal"—a mounting medium prepared by Flatters & Garnett, 309, Oxford Road, Manchester, or with Gurr's Neutral Mounting Medium—prepared by G. T. Gurr, 136, New King Road, Fulham, London, S.W.6; then place on it a perfectly clean thin long cover slip 2 × 1 inches in size. Such preparations will keep without fading for at least six months, usually for a year.

5. *Re-staining old slides.*—In the writer's experience there is no really satisfactory method of re-staining old slides. Daniels recommends the following, though we have not found it very successful. Treat the film for a few minutes before staining with a mixture of 3 to 5 drops of glacial acetic acid to 1 oz. of absolute alcohol. Wash extremely thoroughly in neutral distilled water, to remove every trace of acid. Stain with Leishman's or Giemsa's stain in the usual manner. Old blood films take on a deep blue staining of the red corpuscles, instead of the normal orange-pink. To some extent this can be got rid of by flooding the slide with a 1 per cent. watery solution of acid sodium phosphate, but the results are never too good.

Staining the Thick Film.

For his combined thin and thick film on the same slide, Sinton recommends the following method:—

The thin film is first fixed by dipping it into either methyl alcohol for 3 minutes or absolute alcohol for 10 minutes. It is then allowed to dry completely. The entire slide, both thin and thick films, is then cautiously flooded with Giemsa's stain (diluted, 1 drop to each c.c.), and staining completed in the usual manner.

In the writer's experience, in endemic kala-azar areas, this procedure plasmolyses any *Leishmania donovani* which may be present, and is not of help in differentiating kala-azar from malaria. In such areas it is necessary to fall back on some method which both fixes

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and dehæmoglobinises the thick film. The following is advocated by Knowles and Das Gupta (1924):—

1. Lay the film on a staining rack and gently flood the slide with the following mixture:—

Glacial acetic acid; 2.5 per cent. solution in distilled water .. .. 4 parts.
Tartaric acid, crystalline; 2 per cent. solution in distilled water .. .. 1 part.

This mixture keeps indefinitely, and it is better to keep the two solutions mixed, as fungi are apt to grow in the tartaric acid solution. It should be kept in a stoppered bottle.

2. This solution dehæmoglobinises the film, and the process should be watched. An ordinary thick film quickly dehæmoglobinises, but films with thicker patches may take a little longer. The dehæmoglobinised film should show a grey-white colour.

3. As soon as dehæmoglobinisation is complete, drain off the fluid by gently tilting the slide. Flood the slide with methyl alcohol, and allow this to remain on for five minutes. The film is now dehæmoglobinised and fixed.

4. Drain off the methyl alcohol and wash the film *very thoroughly* with (neutral or very slightly alkaline) distilled water. Every trace of acid must be got rid of.

5. Stain the film with Giemsa's stain, one drop to each c.c., for 20 minutes or longer. Differentiate in the usual way with distilled water. Do not blot the film, but let it dry by slanting it against a vertical surface, film side downwards.

If careful attention is paid to details in this technique, the results are excellent. Further, in the endemic kala-azar areas it gives some 67 per cent. of positive findings in cases of kala-azar, and is of special value in differentiating between the two diseases.

The Diagnosis of Malaria by Culture.

Cultivation of the malaria parasites *in vitro* was first accomplished by Bass and Johns (1912). The original technique was simplified by J. G. and D. Thomson (1913, 1913*a*), whilst we now use a slight modification of the Thomsons' technique. Between the years 1921 and 1930 a great change has occurred in the methods employed in the diagnosis of malaria in the Protozoology Department of the Calcutta School of Tropical Medicine. From 1921 to 1924 we relied chiefly upon the prolonged search of thin films. From 1924 to 1928 this was supplemented in each case by the examination of thick blood films in addition from each patient. From the beginning of 1929, however, we have used Bass' culture as a routine method of diagnosis in every case. The method is so simple, so easy of application, and requires so little equipment that it should always be employed in the laboratory in all difficult and obscure cases.

The chief advantages of the cultural method in malaria are the following:—

1. It will enable one to diagnose cases in which the parasites are so scanty that they cannot be detected either in thin or thick films.

2. In cases where only ring forms are encountered in the film and one is uncertain of which species is present, a culture will enable one to diagnose the species with certainty.

3. It is of special value in those all too common cases where the patient has taken a 5-grain dose of quinine before sending for the doctor. This dose is sufficient to prevent one finding parasites in the thin (and often even in the thick) film, but quite insufficient to control the fever. Under such circumstances, however, a Bass' culture will be positive.

4. It will enable one to detect the real frequency of mixed infections.

5. The life history of *P. falciparum* (as it occurs in man) can be studied in such cultures, and such forms as developing trophozoites, schizonts, and young gametocytes—which are only but rarely encountered in peripheral blood films—can readily be studied in cultures.

Details of the technique are as follows:—

1. A 50 c.c. thick walled (Erlenmeyer) flask is taken and 20 to 30 glass beads are introduced into it. It is plugged with cotton-wool, and the whole autoclaved.

2. A 50 per cent. watery solution of Merck's dextrose *purissimum* is prepared, and sterilised by steaming for half an hour daily on each of three consecutive days.

3. A 5 c.c. syringe is sterilised. This can be accomplished either by washing it out in turn with olive oil heated to 160°C., with sterile 1 per cent. sodium carbonate solution, and then with sterile normal saline; or by washing the syringe through repeatedly with a mixture of 1 part of lysol to 9 of alcohol, then with rectified spirit, then repeatedly with normal saline. The syringe must be sterile; it may contain traces of normal saline, but no trace of water should be present, as this will plasmolyse the parasites.

4. Take 5 c.c. of blood from the patient's vein and transfer it to the flask, being very careful that air bubbles do not form. Next by gentle rotation of the flask on the laboratory bench by hand defibrinate the blood.

5. Sterile miniature test tubes, $12\frac{1}{2} \times 1\frac{1}{4}$ cms. in dimensions, are next taken. Into the bottom of each introduce one drop of the dextrose solution with a sterile capillary pipette. With a sterile capillary pipette aspirate off the defibrinated blood from the flask, and introduce it into the miniature test tubes, so that there is a column of blood about $2\frac{1}{2}$ cms. in depth in each. Plug with flamed cotton-wool.

6. Warm the upper part of the tube in order to expel air. Whilst it is still warm, seal by fitting over its mouth a rubber teat. This gives partial anærobiosis.

7. Set the test tubes vertically in plasticine and incubate at 37°C. (Growth will also occur at room temperature, but more slowly.)

By the next morning the column of blood will have settled in the test tube into three layers; a layer of clear plasma above; then a very thin leucocyte layer; with the red corpuscles below. With a capillary pipette aspirate material from the upper surface of the deposit of red corpuscles, prepare films in the usual manner, and stain by Leishman's or Giemsa's stain in the usual manner.

Cultures should be examined, if necessary, at 12, 24 and 48 hours after they have been put up.

This method has still one further advantage. If one wishes to test whether a given line of treatment in malaria has or has not eradicated all parasites from a patient's system—(as contrasted with merely clinical "cure")—blood culture is the most delicate test that can be applied. If a culture of 5 c.c. of the patient's blood fails to show parasites, it is evidence very considerably in favour of the malaria infection having been exterminated.

The Leucocyte Count in Malaria.

At one time considerable reliance was placed on the total and differential leucocyte count in malaria. To-day, however, with the introduction of the thick film and cultural methods, the leucocyte count has largely fallen into disuse.

D. Thomson (1911), on a most careful examination of the whole question of the leucocyte count in malaria, comes to the following conclusions:—

1. Fever plus leucocytosis plus an increased percentage of polymorphonuclears is not malaria. It may mean sepsis.

2. Fever with leucopænia and a large hyaline mononuclear increase—e.g., 12 to 15 per cent. (in the absence of kala-azar)—is strong confirmatory evidence of malaria.

3. A persistently high large mononuclear percentage, with from time to time a leucocytosis, should arouse the suspicion of malaria.

4. Leucocytosis *per se* does not necessarily exclude malaria.

Stephens and Christophers (1904) state that a figure of over 15 per cent. of large hyaline mononuclears (in the absence of kala-azar) is diagnostic of malaria, whilst

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if 20 per cent. be encountered (in the absence of kala-azar) further search of the films will usually show malaria parasites. Knowles (1920) contrasts the leucocyte findings in kala-azar and malaria as follows:—

	KALA-AZAR.	MALARIA.
Total leucocyte count.	Usually under 3,000.	Between 3,000 and 5,000.
Leucopænia ..	Constant and progressive.	Fluctuating.
Percentage of large mononuclears.	20 per cent. or more.	10 to 16 per cent., not usually over 20 per cent.
Percentage of polymorphonuclears.	Usually less than 50 per cent.	Usually more than 50 per cent.

Whilst leucopænia is the general rule during the febrile phases of an attack of malaria, leucocytosis may be associated with severe infections with *P. falciparum*, especially during the earlier rigors.

In Calcutta, the chief value of the total and differential leucocyte count is in differentiating influenza and dengue from malaria. In influenza the film will often show some evidence of a polymorphonuclear leucocytosis; in dengue leucopænia—which reaches its maximum about the fourth day of the disease—is in evidence, whilst there is a complete or almost complete absence of coarsely granular eosinophile leucocytes.

The finding of hæmozoin pigment in the cytoplasm of the large hyaline mononuclear leucocytes is evidence that the patient is or has been suffering from malaria. The observer must satisfy himself, however, that what is present is true hæmozoin, and neither the azure granules of chromatinic origin so frequently seen in the cytoplasm of the large hyaline mononuclears, nor dust. Dust, when present on the slide, may be on the surface of such a cell, but will also be present between the cells.

The Personal Factor in Diagnosis.

The last point to which I should like to refer before concluding, is that of the personal factor in diagnosis, by which I mean the training and experience of the observer. This point has been dealt with on experimental lines by Knowles and Senior-White (1930). Four "tests" were carried out, as follows:—

Test 1.—Eight microscopes were set out, and under each a single malaria parasite was focussed in the field; for the most part a single ring. Forty-five students from the Calcutta D.T.M. class of 1928-29 volunteered for the test. Each passed in turn to each of the eight microscopes, was allowed three minutes at it, and recorded his diagnosis of the species present. No talking or communication was allowed, and at the end of the test the writer collected all papers. The slide was not moved.

The result was an accuracy of only 41 per cent. Now these students were near the end of their class; they had had no end of malaria films for study during the previous six months, and were just about to go up for their examination for the Diploma. The results were so disappointing that a second test was decided upon.

Test 2.—Seven microscopes were set out, and under each a malaria blood film. The same students as before volunteered. Each passed to each microscope in turn, was allowed five minutes at it, and was allowed to use the mechanical stage, and to see as much of the film as he could in that time. Otherwise, conditions were the same as in Test 1. The percentage of accuracy now rose in this test to 80 per cent.

We may conclude that the accuracy of the "brigade" or "divisional laboratory" standard of worker is approximately 80 per cent.

Test 3.—In order to check these results, we decided to repeat tests 1 and 2 with "experts"—or at least volunteers who have been diagnosing malaria species during a lifetime of laboratory work in the tropics. The volunteers for tests 3 and 4 were: Lieut.-Col. H. W. Acton, C.I.E., I.M.S.; Lieut.-Col. R. Knowles, I.M.S.; Dr. P. A. Maplestone, Dr. C. Strickland, Dr. L. E. Napier—all of the Calcutta School of Tropical Medicine; Mr. R. Senior-White, Malariologist, Bengal-Nagpur Railway; Capt. B. S. Chalam, Malariologist, Eastern Bengal Railway; Dr. T. N. Sur, Offg. Professor of Pathology, Calcutta Medical College; and Dr. B. M. Das Gupta, Assistant Professor of Protozoology, Calcutta School of Tropical Medicine.

Test 3 consisted in a repetition of test 1, with these volunteers. Here there can be no question of "accuracy," since it is a matter of the opinion of one "expert" with regard to species as against that of another. The percentage of "agreement" in test 3 was 63 per cent.

Test 4 consisted of a repetition of test 2 with the "expert" volunteers. The percentage of "agreement" with regard to the species present now rose to 93 per cent.

The moral from these four tests is obvious. It is the usual custom in laboratories to diagnose the species of malaria parasite present on the first or first and second parasite forms encountered, and then to discard the slide. Such a procedure will give a wrong diagnosis of species as often as not. Some standard method of examining blood films should be adopted by all laboratory workers. As few such workers are willing to spend more than 10 minutes on the examination of a case, we suggest that not less than 8 minutes should be spent on searching the thin film, together with at least 2 minutes on a thick blood film from the same patient. In all cases it is desirable that a Bass' culture should also be taken.

In conclusion, I should like to emphasise again that accuracy in the laboratory diagnosis of malaria is very largely dependent upon the most meticulous attention being paid to details of technique.

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IMPRESSIONS OF A TOUR TO IMPORTANT TUBERCULOSIS CENTRES IN EUROPE AND AMERICA.

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THIS extensive tour was taken with a view to visit important sanatoriums, tuberculosis hospitals, and clinics in Europe and America and study the methods employed in different places and also see how far they could be made applicable to Indian conditions. It will perhaps be interesting to recall some of the interesting points observed in various places for the benefit of the medical profession in this country.

England.

Cardiff.—Cardiff is rather an important place for studying tuberculosis, being the headquarters of the well organised King Edward VII Welsh National Memorial Association. Colonel Lyle Cummins is Professor of Tuberculosis in the University of Wales. He is pre-eminently fitted for research in the laboratory and is, in addition, a master of the epidemiology of tuberculosis. Contrary to the popular belief held by the medical profession, he has attempted to show, by a critical study and interpretation of the mortality figures in tuberculosis supplied by the Registrar-General, that while phthisis in young-adult age might be due to "endogenous reinfection" resulting from the unstable or "larval" lesions, as he calls them, of childhood, in later age—in city life especially—it is caused by "exogenous reinfection" brought about by a gradual accumulation of tubercle bacilli in the lymphatic system, and not by endogenous reinfection as is commonly believed, because the larval lesions of childhood by this time become stable or "compensated."

Professor Cummins has also done some experimental work with sanocrysin on guinea-pigs and has found that the drug does produce some healing effect on tuberculous foci in the lungs.

Cardiff possesses two important tuberculosis hospitals, Cefn Mably for the disease of the lungs and Glan Ely for surgical tuberculosis, both of which are part of the Welsh National Association which has also a Central Research Laboratory in Cardiff.

The Association has got a big popular sanatorium in Telgarth. Dr. Morriston Davies, who is consulting surgeon to this sanatorium, is the pioneer of thoracoplasty in England. He does not believe in the operation of apicolysis and is of opinion that partial thoracoplasty of the upper ribs gives more satisfactory results.

Contrary to the growing opinion that the annular shadows seen in radiograms of the chest are due to excavations in the lungs (intrapulmonary), Dr. Morriston Davies still believes that a fair proportion of them are the result of "pleural rings" (extrapulmonary).

London:—Brompton Hospital.—This is perhaps the biggest hospital in Great Britain for diseases of the chest and is visited by some of the famous Harley Street specialists. Special short post-graduate courses are given twice every year and are, in my opinion, very interesting and instructive especially for those who have had previous experience in the disease. Two eminent surgeons are attached to the Hospital—Mr. Tudor Edwards and Mr. A. E. J. Roberts—who have their different methods of doing thoracoplasty. A good deal of artificial pneumothorax work is done, but in the opinion of Mr. Roberts, England is still behind other European countries in the surgical treatment of pulmonary tuberculosis and he held the view that when a patient with unilateral lesions did not improve readily under ordinary routine treatment, some form of collapse-therapy must be considered.

Sanocrysin is used considerably. Dr. Burrell recommends fairly big doses commencing with 0.1 gramme and going up to 1.0 gramme at weekly intervals; while Dr. Hope Gosse believes in very small doses, never going beyond 0.1 gramme which he repeats every week for an indefinite period.

Lipiodol is used for differentiating other lung conditions especially bronchiectasis, lung abscess, and malignant growth from pulmonary tuberculosis and is administered by the crico-thyroid route.

Dr. Melville believes that the annular shadows seen in radiograms are due to cavities in the lungs, but he very humorously said that the question could only be settled on the other side of the grave.

Victoria Park Hospital.—Dr. Chandler is the visiting physician. He has made a modification in his thoracoscope and performs the cauterisation of adhesions by "one-puncture method." He has also made a modification in the Pearson and Lilingatone model of artificial pneumothorax apparatus, in which the "pressure bottle" slides up and down on a vertical rod and this is very convenient for hospital practice.

Sanatoria at Frimley, Midhurst, and Nayland.—The Frimley and Midhurst sanatoria are famous in England. The former is for the working classes and the latter for the professional classes. The statistics of these two places are often compared with each other to see the results achieved in the two classes of people.

The Brompton Hospital Sanatorium at Frimley is in charge of Dr. Wingfield. He performs bilateral pneumothorax in cases where the disease has spread to the other lung during the course of artificial pneumothorax treatment on one side. He expressed the opinion that treatment in sanatoria is not suited to the peculiar social and economic conditions in India and thought that it was far better to treat the patients in their homes or in hospitals. Dr. Wingfield may or may not be right in the view he holds but I do think, as I have said elsewhere, that "until we realise that tuberculosis is a national danger and until we establish 'after-care societies' that will render help to ex-patients and until we pass such acts as the Insurance Act, Health and Tuberculosis Acts, etc., etc., as England and other European countries have done, it is idle to talk of sanatorium treatment for 'all'—rich and poor."

The King Edward VII Sanatorium at Midhurst is in charge of Dr. Trail who lays great stress on "initial rest" to all patients in general and to female patients in particular, to watch, in the case of the latter, how the temperature behaves during the menstrual time. He still uses tuberculin in certain types of cases and advocates phrenic avulsion for hæmoptysis where artificial pneumothorax fails to produce the desired effect.

The East Anglian Sanatorium at Nayland is more or less a private concern in charge of Dr. Jane Walker, a veteran lady worker in tuberculosis. The Sanatorium has a beautiful site.

Papworth Hall and Village Settlement.—This remarkable place is the achievement of Dr. Varrier Jones who may be said to be its actual creator and guiding spirit. The Settlement is divided into two sections, viz., the Central Institution and the Industrial Section, both of which work in close co-operation. The Central Institute contains the Hospital and Sanatorium while the Industrial Section is composed of the workshops and model cottages for housing the ex-patients and their families. The Papworth Industries are the backbone of the Settlement and are run by consumptives for consumptives. There is a school for children of the settlers. In short, the Settlement is a self-containing unit and the social life is not lacking in variety. It was indeed a pleasure and privilege to be able to visit Papworth and leave it inspired, instructed, and grateful.

In the Annual Meeting of the National Association for the Prevention of Tuberculosis I had the opportunity of meeting Sir Robert Philip who is Professor

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of Tuberculosis in the University of Edinburgh. He is the founder of the tuberculosis dispensary as an important unit in the crusade against tuberculosis, the functions of which are to serve as receiving house, clearing house, and centre for observation and investigation. Sir Robert Philip advocates the repeated use of diagnostic tuberculin from early childhood to find out the time of tuberculisation and to take precautions to prevent the onset of the disease.

United States.

Saranac Lake:—Trudeau Institution.—I consider myself extremely fortunate in making a pilgrimage to this temple of learning and paying my homage to the life-long work of the late Dr. Edward Livingstone Trudeau who was the pioneer of sanatorium treatment in America. Dr. Trudeau was himself a victim of tuberculosis and his autobiography makes fascinating reading. The Institution is composed of the following:—

(1) The Trudeau Sanatorium—founded by Dr. Trudeau himself.

(2) The Training School for Nurses—where young women with arrested disease are trained.

(3) The Trudeau Foundation—which is an Endowment Fund in memory of Dr. Trudeau and maintains:—

(*a*) The Trudeau School of Tuberculosis—which gives short post-graduate courses on tuberculosis.

(*b*) Fellowships—which provide support for young doctors who are undergoing treatment.

(*c*) Research and Clinical Laboratories—for the study of bacteriology, pathology, experimental tuberculosis, etc.

Dr. Lawrason Brown has, by his hard work and ability, raised the efficiency of the Sanatorium to a very high standard. In the diagnosis of pulmonary tuberculosis great importance is laid on the following points in their order:—

(1) Tubercle bacilli in sputum.

(2) Persistent moderately coarse râles in the upper part of the chest.

(3) *X*-ray evidence of parenchymatous changes in the lungs.

(4) History of definite hæmoptysis without any known cause.

(5) History of idiopathic pleurisy, especially with effusion.

The *x*-ray department is in charge of Mr. Homer Sampson. Lawrason Brown and Homer Sampson have by their extensive studies shown the importance of intestinal tuberculosis as a complication of pulmonary tuberculosis and its early diagnosis by means of *x*-rays. In many cases a positive diagnosis by clinical and laboratory methods cannot be made, but *x*-rays have made this possible, the diagnostic criteria being hypermotility and filling defects. By way of treatment they lay great stress on heliotherapy, natural or artificial, the quartz mercury-vapour lamp is favoured. It was interesting to note that most of the patients were taking the now-much-in-vogue tomato juice and cod-liver oil as a prophylactic.

Dr. Petroff is making interesting researches on the separate kinds of tubercle bacilli which have attracted the attention of outsiders. He has also dissociated "R" and "S" colonies from Calmette's B. C. G., which I saw with my own eyes in his laboratory.

The Trudeau Sanatorium has also got a statistical department whose work is recognised by everybody. It allows the sanatorium to keep in touch with their ex-patients and it is also the only way by which a complete picture of the course of pulmonary tuberculosis can be obtained.

A very important feature of the Trudeau Sanatorium is that on Mondays and Wednesdays there are held meetings of the staff to discuss the diagnosis, prognosis and treatment of difficult cases, and on Fridays the "question box" is opened and answers are given to questions put by the patients.

It is encouraging to find that practically all the staff from Baldwin and Brown downwards consists of ex-patients. The Sanatorium is built on the "pavilion system."

The Ray Brook Sanatorium.—This is reserved for *bona fide* residents of the State of New York. Dr. Baldwin took me to an interesting lantern-slide demonstration on fuso-spirochætal diseases of the lungs, given by Dr. Smith who is pathologist to the Sanatorium. According to him, these lung conditions result from symbiosis of four kinds of organisms, namely, (1) *Spirocheta buccalis*, (2) a vibrio, (3) fusiform bacilli, and (4) streptococci, none of which alone can cause the condition. In his opinion, bronchiectasis, lung abscess and gangrene are but different stages of the same condition produced by the combination of these four organisms.

New York City:—Bellevue Hospital.—This is one of the biggest hospitals in the U. S. A., and has a big tuberculosis section in charge of Dr. Amberson, while Dr. James Alexander Miller is the visiting physician. From his extensive experimental work with sanocrysin, Dr. Amberson has found that sanocrysin damages the kidneys even when there is no obvious evidence of it and he therefore condemns its use in treatment.

Presbyterian Hospital.—This is attached to the "Medical Centre" of New York City. There is no "indoor" for admitting tuberculous patients who are treated in the "outdoor" where they receive their "refills" and other treatment.

New York City Tuberculosis Association.—This is only for the City of New York and is separate from the American Tuberculosis Association. Mr. Drolet, who is the Secretary, has prepared interesting statistical charts showing how, under improved conditions, the mortality from tuberculosis has decreased in the City. Mr. Drolet did not believe in B. C. G.

Canada.

Montreal.—Having read and heard about Dr. E. W. Archibald as a famous lung surgeon, I made it a point to go to Montreal and visit his clinic at the Royal Victoria Hospital. Dr. Archibald has probably performed over 200 thoracoplasties and may well claim to be an authority on the subject. He does the operation in three stages, namely, (1) resection of the posterior lower ribs, (2) of the posterior upper ribs, and (3) finally the remaining portions of the ribs are cut away near the border of the sternum. This last or lateral stage, according to him, helps in producing a very efficient collapse of the lung.

Dr. Archibald has an able assistant in Dr. Bethune, who was still undergoing artificial pneumothorax treatment, and it was interesting to note that the "refills" were given by himself. The administration of lipiodol is done through the mouth (supra-glottal route).

Germany.

Hamburg:—Eppindorf Hospital.—Professor Brauer, who is the Medical Director, is well known in the tuberculosis world as one of the pioneers of lung surgery in Europe. He performs thoracoplasty by his own method which is called "subscapular para-vertebral resection." Dr. Brauer contends that the operation secures a better collapse of the lung and results in a higher proportion of practical cures. It is interesting to mention that Dr. Brauer was himself a victim of tuberculosis at one time.

Professor Knipping showed me his metabolism apparatus and gave a practical demonstration of its use. He laid emphasis on the importance of basal metabolism in tuberculosis. The instrument certainly gives credit to its author but, to my mind, the apparatus is chiefly of academic interest, being too complicated and too technical to be of any use in general practice.

Sanatorium Edmundsthal-Siemerswalde.—This is situated in Geesthacht, not very far from Hamburg. Von Dr. Ritter is in charge. It is a big institution with two sections—Hospital and Sanatorium—and admits men, women and children. It is situated on a beautiful pine-clad site.

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Berlin:—Professor Saurbruch's Clinic.—This is a surgical clinic with a special development of the surgical treatment of pulmonary tuberculosis. Professor Saurbruch is one of the finest lung surgeons in the world and people come from far and wide to attend his clinic and watch his operations. His method of thoracoplasty is called "para-vertebral resection."

Investigations on the medical treatment of tuberculosis are also carried on here. Special mention may be made of the "Gerson-Saurbruch diet" which is arousing considerable interest in Germany and Austria. The diet aims at (1) complete abstension from common salt, (2) limitation of animal protein, (3) reduction of carbohydrates, (4) increase of fats and lipoids and (5) addition of raw food-stuffs containing vitamines. It is essentially a salt-free diet based on the theory that the removal of salt from the food tends to dry up the tissues and helps in the healing of the exudative lesions of tuberculosis. Favourable results are reported in cases of surgical tuberculosis and lupus as well as in pulmonary tuberculosis.

Austria.

Vienna.—This is a place of international reputation to which medical men from all parts of the world flock. There is an organisation of the American Medical Association, the main object of which is to promote international post-graduate study in various branches of medicine.

Professor Tandler, who is the medical head of the tuberculosis organisation for the city, very kindly arranged for my visit to the dispensary, hospital, and sanatorium. It was a pleasure to see the three places which form a chain in the work, each link working in close co-operation with the other. I was impressed especially with the hospital which is very big indeed, and built on the most modern lines. The operations are performed mostly under local anæsthesia.

France.

Paris:—Laennec Hospital.—Professor Rist and Professor Leon Bernard, who are attached to this hospital, are well known in the tuberculosis world. Professor Rist does a lot of artificial pneumothorax work. He told me about 90 per cent. of his cases were getting this treatment. He gives the treatment in early cases and told me that he had to repent for not doing it in one case. He also does bilateral pneumothorax. Cauterisation of adhesions—even fairly broad ones—is also done. He believes that the annular shadows in radiograms are due to cavities in the lungs and quoted an aphorism that more cavities were discovered by Laennec than Skoda and still more by Roentgen than Laennec. He gives sanocrysin empirically but could not say why the drug acts favourably in some cases and not in others. The direct method of auscultation was frequently employed.

Pasteur Institute.—Professor Calmette is in charge of this Institute. A considerable amount of literature and a great deal of controversy have gathered round his B. C. G. This organism when first isolated in 1908 by him was of bovine origin and virulent, but by a process of continuous cultivation on glycerinated-potato-bile medium, according to Calmette himself, it has lost its virulence. Given within the first ten days of life by the mouth, Calmette claims that it produces immunity against tuberculous infection. Much work has since been done to test the accuracy of Calmette's claims. The "dissociation" experiments, carried out by Petroff in Amercia, have resulted in the production of two types of colonies—"R" (rough or non-virulent) and "S" (smooth or virulent). The occasional infection caused by the administration of B. C. G. is explained by Petroff as follows:—By means of continuous subculturing on glycerine-potato-bile media Calmette has succeeded in eliminating practically all the "S" colonies and allowing the "R" to predominate. But the virulent "S" colonies have not been completely eliminated and, although present in very small numbers, they may under favourable conditions increase still more with the result that infection might take place.

The statistical figures offered by Calmette in favour of B. C. G. have been subjected to severe criticism by Dr. Greenwood of England according to whom they do not prove the case.

The trend of opinion in the Conference of the International Union against Tuberculosis held in Oslo (Norway) last year seemed, however, to be in favour of B. C. G. as producing temporary immunity against mild infection.

Switzerland.

Switzerland is famous for its bracing climate. There is no doubt that Switzerland is the most picturesque country in Europe and it is not for nothing that Switzerland is famous for the climatic treatment of tuberculosis.

Leysin:—Dr. Rollier's Clinic.—In this clinic surgical tuberculosis of all kinds is treated by heliotherapy. The knife is not used at all. Results are said to be satisfactory and relapses uncommon. Dr. Rollier restricts the use of meat to his adult patients, while children are given no meat at all. Emphasis is laid on the use of fresh vegetables and fruits. The use of all alcoholic drinks is forbidden.

Leysin is full of popular and private sanatoria. Special mention must be made here of the Sanatorium Universitaire (Suisse). This sanatorium has been constructed for the benefit of Swiss students from contributions made by the staff and students of various Swiss universities. There is a big scheme for widening its scope and turning it into an International University Sanatorium. The idea is that of Dr. L. C. Vauthier, the Warden of the Sanatorium, who is exerting his utmost to see the realisation of his cherished dream. The proposal does deserve serious and sympathetic consideration by various countries.

Montana.—This is another important place for sanatoria. Dr. Stephani's Sanatorium deserves mention here because wealthy Indian patients generally go to his sanatorium. Dr. Stephani had come to India some years back on a professional visit to Patiala State.

The Montana Hall is the only sanatorium of its kind in Switzerland, being a purely British concern under British ownership and control. Dr. H. Roche is the Superintendent.

The Swiss sanatoria seem to believe in the "rest cure." Importance is not attached to exercise as a part of treatment. Gold injections are used—some favour sanocrysin, while others salganol or allochrysin. Small doses are given. Artificial pneumothorax is given in early cases. One doctor observed that the danger lies in doing it too late rather than too early. "Selective collapse" of the lung is aimed at, pressures being kept as near zero as possible. Bilateral pneumothorax is also done a lot. So also phrenic avulsion, especially for cavities in the upper lobes. I was particularly pleased to see bilateral phrenic evulsion with very satisfactory results.

The Swiss sanatoria are business concerns, being more like hotels than sanatoria in the strict sense of the word.

Italy.

Milan.—This is the commercial capital of Italy. I met Felix Cova who very kindly showed me the City Dispensary and Sanatorium. The Sanatorium is very big, having accommodation for 1,000 patients—men, women and children. Professor Cova has done a large number of thoracotomies which he performs by the original "two-puncture method" of Jacoebeus. He has prepared a fine *Atlas Thoracoscopion*, the description of the plates being given in three languages including English. The preface is written by Jacoebeus himself.

In Milan I saw and purchased a portable model of artificial pneumothorax apparatus improvised by Dr. Carpi who is in charge of the Tuberculosis Hospital. The apparatus is very handy indeed, being contained in a small wooden box. It is very convenient for private practice and the price is 450 lires or roughly £5. Its size is 12¼ metres in length, 4½ metres in breadth, and 3 metres in depth.

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Conclusion.

The impression left in my mind after seeing the various places is that the work is carried out on systematic and scientific lines. It appeared to me however—as has been pointed out by Mr. Roberts—that England was rather conservative in treatment as compared to other European countries. The reason probably lies in the observation made by Marcus Paterson that it is the national British characteristic to move slowly. The use of X-rays is nowhere made so much use of as in America. It is probably for this reason that Fishberg could make a nice distinction between apical and subapical phthisis in the matter of prognosis. The use of tuberculin on any large scale was not in evidence anywhere. America believed neither in the efficacy of sanocrysin nor in the immunisation with B. C. G.

And where do we stand in India? We are far behind the western countries in the modern methods of treatment—I am referring especially to collapse-therapy. Treatment by artificial pneumothorax has become so popular and universal in the West that every patient expects his physician to suggest this method of treatment. In this country, on the other hand, considerable difficulty is still experienced in arranging for the "refills" when the patients are discharged from the sanatorium. Lung surgery has become a speciality in the West. In India, where a large number of patients are diagnosed and treated too late to be fit for artificial pneumothorax treatment, thoracoplasty is a procedure to which more attention ought to be given than has been the case so far. There is, indeed, great scope for lung surgery in this country.

It is an admitted fact that tuberculosis is on the increase at present in India. Side by side with this there exists a deplorable lack of knowledge of the disease among the general medical profession. The importance and seriousness of the disease demand that tuberculosis should be included as a special subject among the medical studies in universities, and arrangements should be made for practical demonstrations in tuberculosis dispensaries, hospitals, and sanatoriums. Provision should also be made for post-graduate training in tuberculosis for doctors in general practice so that they may constantly remain in touch with modern advancements in the diagnosis and treatment of the disease. While western countries are going ahead with their work, India cannot afford to lag behind in this respect.

Medical News.

BOMBAY MEDICAL COUNCIL.

THE following summary of the proceedings of the meeting of the Bombay Medical Council held on the 23rd February, 1931, is published for information.

1. The following six members were elected by ballot as members of the Executive Committee:—Lieut.-Col. R. Row, O.B.E., M.D., D.SC. (Lond.), Sir Temulji Nariman, *Kt.*, L.M., M.R.C.P., F.C.P.S., Khan Bahadur Sir Nasarvanji Choksy, *Kt.*, C.I.E., M.D., F.C.P.S., Dr. Rajabally V. Patel, M.D., F.C.P.S., Lieut.-Col. A. N. Thomas, D.S.O., I.M.S., and Dr. Dinshah M. Gagrat, L.M.S.

2. The Council considered the case of Mr. Kaiku Sorabji Ghasvala, L.M.S. (Bombay), a medical practitioner registered in Bombay, who had been summoned to appear before the Council to answer the following charges:—

(1) That contrary to rule 20 of the Code of Medical Ethics he has styled his private Nursing Home, Dispensary or Hospital after his own name, and

(2) that contrary to rule 22 of the same Code upon the notice or signboard exhibited outside the building in which he carries on his practice he mentions certain positions therein stated to have been held by him on the staff of the Sir C. J. Eye Hospital and at the Grant Medical College.

The Council held that the facts alleged against Mr. Kaiku Sorabji Ghasvala had been proved to the satisfaction of the Council, but resolved to postpone their judgment and adjourn the case until the next Session.

3. The Council considered the case of Mr. Phirozshah Kavasji Hodivala, M.B.B.S. (Bombay), a medical practitioner registered in Bombay, who had been summoned to appear before the Council to answer the following charges:—

(1) That contrary to rule 2 (a) of the Code of Medical Ethics he granted three certificates dated the 19th May, 1930, to (*a*) Mr. M. D. Desai, (*b*) Mr. Manibhoy Lallubhoy, and (*c*) Mr. Manibhoy Ashabhoy respectively to the effect that they had been vaccinated by him on that day, while the three persons abovenamed have declared in writing before the Port Health Officer, Bombay, that they were actually vaccinated on the 25th May, 1930;

(2) that similarly he granted on the 20th May, 1930, a certificate to Mr. Attaf Hussain Khan to the effect that he had been vaccinated by him on that day while the said Mr. Attaf Hussain Khan had in a written statement declared before the same Officer that he was actually vaccinated on the 26th May, 1930.

The Council judged Mr. Phirozshah Kavasji Hodivala to have been guilty of infamous conduct in a professional respect and directed the Registrar to erase his name from the Medical Register.

4. The Council considered a reference from the Bombay Government forwarding an application from Mr. Popatlal T. Sanghvi for permission to be registered under section 7 (3) of the Bombay Medical Act, and resolved to inform Government that in view of the evidence which he had since produced that he had a regular medical training in 1911, the applicant may be granted the permission applied for.

5. The Council ordered to be recorded communications received from the General Medical Council showing that the name of Mr. Ratilal Shivlal Shah, M.B.B.S. (Bombay), which had been erased from the Bombay Medical Register in September 1928 under section 9 of the Bombay Medical Act for infamous conduct in a professional respect, had also been removed from the British Medical Register after a formal enquiry held by the General Medical Council on the 26th November, 1930.

6. The Council ordered to be recorded the judgment of the Chief Presidency Magistrate, Bombay, dated the 17th January, 1931, convicting Mr. P. Rai K. Baxi and sentencing him to pay a fine of Rs. 100 for an offence under section 18 of the Bombay Medical Act 1912 in that he used after his homœopathic titles obtained from the Madras Homœopathic College, Conjeeveram, the words "Registered by Government," which were calculated to convey to an ordinary layman the impression that he was registered under the Bombay Medical Act or rules framed by Government.

THE WELLCOME FOUNDATION MEDICAL AND CHEMICAL RESEARCH BUILDING.

THE Wellcome Foundation, Ltd., is about to erect a new medical and chemical research building at the corner of Gordon Street and Euston Road on the site, 225 feet by 135 feet, now partly occupied by their Bureau of Scientific Research in London. During many years the Foundation has maintained medical and chemical research laboratories, but recent developments have made it necessary to co-ordinate and extend these activities. The new building will furnish the additional accommodation required, and be provided with the most modern research equipment. Mr. Septimus Warwick, F.R.I.B.A., is the architect.

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LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

EXAMINATION RESULT. 89TH TERM. OCTOBER 1930—FEBRUARY 1931.

Passed with Distinction.

Mackie, T. T. (Winner of "Duncan" Medal).
Abbensetts, N. J.
Cairns, J.
Dakshinamurty, S.
Jones, W. P.
Kasliwal, R. M.
Martindell, E. W.
Noronha, M.
Wallace, R. B.
Welch, J.

Passed.

Abeyesundere, A. J.
Abeyesundere, E. R.
Adams, F. V.
Agbaje, A. S.
Akram, M.
Amarasinha, C. D.
Barclay, J.
Brown, L.
Calwell, H. G.
Campion, C. P.
Chughtai, M. M. U. D.
Clarke, G. J.
Connan, A. E.
Crabbe, T. F.
Dalrymple, T. H.
Diamond, W. C. E.
Dickson, R. F. G.
Edwards, M.
Ellis, D.
Floyd, H. G.
Garde, A. J.
Jensen, J. R.
Leakey, R. A. B.
Ma, Ah.
Mellows, P. B. P.
Merrett, W. E. S.
Moss, B. A.
Noronha, S.
Pringle, L. D.
Sampayo, J. A. S. de.
Sangarapillai, M.
Saram, C. F. W. de.
Semmens, D. W.
Shapiro, J. M.
Thambiah, S.
Turner, D. P.
Weir, E. M.
West, G. F.
Wilcox, R. N.
Wilson, W. A.
Winn, W. E. S.

THE SHAMBHU DAYAL GOLD MEDAL.

WE have been asked by the Director of Public Health, United Provinces, to draw our readers' attention to this medal. The rules for its award are as follows:—

1. A gold medal called the "Rai Sahib Shambhu Dayal Sahib Gold Medal" will be presented for the best prize essay on a public health subject to be announced each year.
2. The subject of the next essay is "The control of malaria in villages and the part to be taken by the public in relation thereto."
3. The competition will be open to the general public, including the medical, public health and educational men in the United Provinces.
4. The essay is to be written in Hindi and should not exceed 3,000 words in length.
5. Essays should reach the Director of Public Health, United Provinces, Lucknow, by August 1, 1931.
6. The name and address of the competitor must be distinctly written on each essay submitted and the envelope should have the words "Prize Essay" in the top left hand corner.
7. The Director of Public Health, United Provinces, shall judge the merit of the essay and his decision with regard to the award of the medal shall be final.
8. No correspondence will be entered into on the subject of competition.
9. No essay will be returned.

Current Topics.

Angina Pectoris.

By M. NEWMAN, M.D., M.R.C.P.

(Abstracted from *The Practitioner*, September, 1930, Vol. CXXV, p. 388.)

ANGINA PECTORIS may be defined as a disturbance of the cardio-vascular system, in which there is a paroxysmal attack of pain, substernal rather than præcordial, and generally associated with the sense of fear and of imminent death, and with disturbance of respiration.

Symptoms.—The three cardial symptoms are:—(1) pain; (2) angor animi, or fear of death; (3) disturbance of respiration. The pain is described by the patient as a crushing, unbearable, agonizing pain, and is like a vice around the chest, and the patient feels as if his sternum was being pressed back to the spine. It is associated with a sense of constriction. It is crescendo in type and may last a few seconds or minutes. The site of the pain is generally beneath the upper part of the sternum, and the patient will generally put his hand there when asked to point out where he felt the pain. Præcordial pain is very uncommon in true angina. The pain may radiate down the left arm, generally along the inner side, corresponding to the eighth cervical and first dorsal nerves. Sometimes it radiates down both arms. It may occasionally radiate to the neck or occiput, and even to the jaw or teeth. Occasionally the pain begins in unusual situations: it may start in the epigastric region, resembling an abdominal disease, but it then generally spreads upwards over the sternum. This is known as angina abdominis. In other cases, it may start in the neck, chin, front teeth, or other unusual situation, but the history is the most important guide in diagnosis, as the pain comes on after exertion.

Associated with the pain is the fear of impending death. The patient feels as if he is dying and that nothing can save him. This is depicted by the terror-stricken appearance of his face. Sometimes this fear occurs without pain, and is known as *angina sine dolore*.

When an attack occurs, the patient if in motion stops still and for the moment holds his breath, and when he breathes again, it is in short, sharp grunts, as if he is afraid to expand his chest, less the pain might increase. There is, however, no dyspnœa.

Signs.—With regard to the signs during an attack, there may be little except the characteristic immobility and expression of the face, which is pale and anguished, or with an expression of intense anxiety. There may be a clammy sweat, the pulse may be unchanged, the heart sounds normal, and the blood-pressure may be normal, although it is often increased. The attack generally passes off gradually, with belching up of wind or the passage of a large amount of pale urine. After an attack, the patient may feel exhausted for some days.

A premonitory symptom is often indigestion. Patients feel that if they could "bring up wind," they would be well. If they are asked, however, where they feel the discomfort, they will point to the centre of the chest, about the mid-sternal region, and if you inquire into the cause of it, you will find the discomfort comes on after exertion, particularly walking after a heavy meal. Even in these mild attacks, there is a tendency towards immobility, i.e., the patient must stand still for a few moments until the discomfort goes.

These attacks, if neglected, may be followed by angina major, so it is important to recognise these cases and to view with suspicion any attack of indigestion which is brought on by effort or by going out into the cold.

Differential Diagnosis.—A typical attack of angina pectoris should rarely be difficult to diagnose, the chief points being the paroxysmal type of pain, coming on generally during or after exertion, the character and distribution of the pain, the sense of impending death, and cessation of respiration, and immobility during an attack; there is no dyspnœa. One should first exclude such pains due to pleurisy, fibrositis, pleurodynia, neuritis. These pains are not paroxysmal, nor brought on by exertion, but are affected by respiration, and the latter has tender points. If the pain begins in the epigastric region, it may be mistaken for colic, the chief points for differentiating are that in colic the patient is restless, whereas in angina he is immobile, there is the absence of impending death, and there may be other abdominal symptoms. There is a type of pain which occurs in the chest, sometimes known as pseudo-angina, and to the inexperienced this may give rise to difficulty in differentiating from true

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angina pectoris. This affection is more frequent in females, and occurs at a younger age, 20 to 40 years, although it may occur at any age. It may be divided into two groups: (1) neurotic; (2) toxic or vasomotor. The first group includes the hysterical and neurasthenic; while the second occurs after infections, such as influenza, and may be due to tobacco, tea or coffee. The exciting causes may be the same as true angina, but the pain often occurs whilst resting, and even in bed. The pain is not of the gripping character of angina pectoris, and lasts longer, perhaps an hour or two. It may be accompanied by shortness of breath, palpitation or fainting.

Coronary Thrombosis.—In the past, coronary thrombosis has been confused with angina pectoris, and the old name of status anginosus, which was given to prolonged attacks of angina, probably described cases of coronary thrombosis. The pain is intense, and like angina, but lasts longer, may be hours or even days. It often occurs while the patient is resting, whereas the pain of angina occurs during exertion. The pain is generally lower down over the sternum than angina. The patient is not immobile, but generally writhing and dyspnœic. He is also collapsed, and may be unconscious. The pulse is small in volume and blood pressure generally low, the heart sounds feeble.

On listening over the heart, a præcordial friction rub may be heard, and the blood shows a leucocytosis. Finally, the electrocardiogram shows characteristic changes.

Prognosis.—There are few diseases in which an intelligent prognosis is more required than in angina pectoris. The name alone immediately causes great anxiety to the patient and doctor alike, as it is generally associated with the thought of sudden death. It has been said of angina that the only certain thing about it is its uncertainty. A man may die in his first attack or he may survive many attacks, and die twenty years afterwards, as did John Hunter. There is also no close relation between the peril of death and the severity of the seizure, and a slight seizure may prove fatal. The problem, therefore, of estimating the prognosis is most difficult, and one must carefully survey all the facts, symptoms and objective findings in each individual case.

The pain of angina is due to (1) afferent impulses arising from the heart and aorta; (2) susceptibility of the central nervous system, which receives the stimuli, as was shown by the late Sir James Mackenzie. There may be a slight stimulus from a fairly healthy heart or aorta, but a very sensitive nervous system, as in the neurotic or neurasthenic type of person. This will cause pain, as described in connection with pseudo-angina, and the prognosis in regard to life in these cases is very good, for by treating the nervous condition the pain will disappear. On the other hand, one might have a strong stimulus arising from a diseased heart or aorta, and, therefore, in estimating prognosis one has to estimate the functional efficiency of the heart muscle, aorta, and general arterial system.

In cases where the heart is only temporarily damaged, such as after an infection, e.g., influenza, or from excessive tobacco smoking, the outlook is more hopeful if the cause be treated; and, similarly in syphilitic cases, intensive antisyphilitic measures may benefit the patient very much. In the other cases, the outlook depends upon the functional efficiency of the myocardium, and so a search should be made for any evidence of myocardial disease. The history of the patient prior to his first attack should first be carefully considered. If he has been able to do a considerable amount of effort prior to his attack, then his symptoms are due to over-exertion of the heart muscle, and adequate rest may enable him to recover his strength; also, if at some time he has had attacks after walking a short distance, but at other times he can walk a few miles without discomfort, it shows there must be plenty of healthy heart muscle, and so the prognosis is favourable. It is sometimes advisable not to give a prognosis the first time a patient is seen, but wait until he has had some rest, and then observe how much he can do after treatment without discomfort.

Dyspnœa.—One indication of impaired myocardial function is shortness of breath on exertion, and if there be no valvular disease, enlarged heart, or abnormal blood-pressure, it may be assumed that it is due to disease of the coronary arteries. If the dyspnœa increases in spite of the treatment, the prognosis is grave, for it heralds the onset of cardiac failure.

Another bad sign is the *pulsus alternans*, when the beats are equally spaced, but unequal in force. This is shown by taking the blood-pressure, when the beats are suddenly halved, owing to obliteration of the smaller pulse. With regard to blood-pressure and angina, about 40 per cent. of the cases show a blood-pressure over 180 mm., but it has been shown that angina patients with high blood-pressure do better than those with normal or low blood-pressure, as the anginal symptoms are often relieved by reducing the high blood-pressure. With regard to angina minor, the prognosis depends on early diagnosis with prompt and skilful treatment, otherwise the prognosis is just as serious as the major form.

Treatment.—One must first of all make sure one is dealing with primary angina, and not with one of the secondary forms, due to tobacco, infection and other causes. The treatment of primary angina consists of the treatment of heart failure. The future life of the patient must be readjusted, so that he can live within the capacity of his heart. The patient should first be ordered to bed for a complete rest, and his daily life thoroughly investigated. While in bed, a detailed examination of all his organs should be made, such as the condition of the kidneys, his Wassermann taken, and blood-pressure investigated, and appropriate treatment prescribed. If syphilitic, arsenical injections should be given with mercury and iodide. If the blood-pressure be high, it should be treated with calomel and salines, and potassium iodide or Collosol iodine, drachms 1 to 2, three times a day, may be given. The amount of rest will depend upon the degree of the heart's failure; some will have to be confined to bed for several months, whilst others may be allowed up after a few weeks, and permitted gradually to do some work. The amount of exercise a person may do will depend on his freedom from pain, for exercise is good for the heart if there are no symptoms of discomfort. Go into the detail of the daily routine of your patient, so that you can eliminate any unnecessary work or worry. Starting at the beginning of the day, the room should be warmed and the windows closed while the patient gets out of bed to dress, because cold may bring on an attack. Similarly, when he goes to wash or to the lavatory, these rooms ought to be heated. He should not go out in very cold weather. Hills should be avoided, no hurrying to catch trains, nor heavy articles carried. Walking against the wind may bring on an attack. He must avoid excitement and emotion, particularly anger. He should go early to bed and rest during the week-ends. It is well to have the bedroom warmed before retiring.

Diet.—It is important to avoid over-distension of the stomach, as flatulence is a frequent cause of an attack, as is, particularly, hurrying after meals. The dietary should consist of small amounts of food of the lighter foods, such as fish, chicken, toast, eggs, stewed fruit; vegetables causing flatulence should be avoided, and also red meat and broths which contain purins, as these act as vaso-constrictors. Fluids should be minimum, and not taken with meals. The food should be eaten slowly and thoroughly masticated. In many cases the angina is the result of over-work and over-worry. In these cases, a sedative to the nervous system is beneficial, such as massive doses of ammonium bromide, grains 20, three times a day. Other drugs that are beneficial between the attacks are the iodides, especially where there is arteriosclerosis, or Collosol iodine may be given, 1 drachm, three times a day. Theobromine, grains 5, three times a day; diuretin, grains 10, three times a day, or better, still, theominal

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tablets, which consist of theobromine and luminal, which act on the nervous system, and are found very beneficial. Knoll's calcium-iododiuretin tablets may also be tried, and often give good results. Many cases benefit from diathermy. Two electrodes are used, one on each arm, or one on the forearm and the other between the shoulder blades. A current of 750-1,250 milliamperes used for a duration of from 20 to 30 minutes, three times a week.

Treatment of the attack.—The attack can often be warded off by taking a carminative mixture such as a menthol draught, or dilute phosphoric acid, 20 minims, with spirits of chloroform, and a bitter. Or a minim of liquor trinitrini in a carminative mixture. Whisky or even warm water may relieve the first discomfort. On the outset of pain, a capsule of amyl nitrite should be inhaled or a tablet of nitroglycerine chewed. If the vasodilators fail, than morphia, grain ¼, should be injected, or a larger dose with atropine. In extreme cases, chloroform may be necessary.

Surgical treatment.—If in spite of all medical measures the symptoms persist, which make work impossible and life unbearable, then operative measures are justifiable. The principle of surgical treatment consists of cutting off the sensory impulses passing from the heart and aorta to the nervous system by means of the cardiac nerves passing to the sympathetic cord in the neck, and then by the rami communicantes to the spinal cord, by means of the first five thoracic nerves. One must remember, however, that there is always the risk of a fatal attack being brought on by the emotion and preparation of the patient for operation, and again, is it wise to abolish the pain, which is nature's warning that the heart is being subjected to too much effort?

To sum up, the success of treating a case of angina is based on the careful consideration of each individual case, the object being to maintain the heart at its maximum efficiency by a well regulated life.

An Early Treatise on Malaria.

THROUGH the kindness of Lieut.-Col. H. W. Acton, C.I.E., I.M.S., we have had access to a quaint but most learned work—*Lectures on the Principles and Practice of Physic delivered at King's College, London*, by Dr. Thomas Watson, M.D.—the first edition of which was published in 1843, and the third edition—the one which we have seen—in 1857. Whatever personal experience of malaria the author may or may not have had, he certainly had studied the disease fully, and devotes two chapters of his work of 1040 pages to it. The chapters concerned consist of a verbatim transcript of his lectures to students.

His first chapter in this connection gives an admirable general clinical account of the ague paroxysm and of the different types of ague. He comments—rightly—on the curious system of nomenclature by which a rigor occurring every 48 hours is termed a fever of "tertian" periodicity. He has certain very interesting observations to record as to the time of day at which the ague paroxysm occurs—in benign tertian malaria usually about noon, to be finished before evening, in quotidian malaria in the morning, in quartan malaria in the late afternoon. "Double tertian fever" is a subject to which he gives considerable attention; he even recognises a double quartan infection. He recognises congenital malaria, and notes that in such cases the movements of the fœtus may be very much diminished on the febrile days; also the tendency of malaria to relapse, and of such relapses to be associated with conditions of trauma—giving by way of illustration the case of a Colonel commanding a battalion in the West Indies who had a relapse of malaria immediately after he was wounded by a musket ball, and thereafter chalked up in his diary the dates on which he expected further relapses.

The special association of malaria with impure air and marsh miasmata, he recognises, but he refuses to believe that this is the real cause. James I and Oliver Cromwell both died of malaria, contracted in London, and the author mentions a severe epidemic in 1827. Every part of the Low Countries was infected with malaria, and he quotes an interesting account of the disease as seen in India from Bishop Heber. Rank and decomposing vegetation are often associated with malaria, but they may exist in its complete absence, and the severe epidemic in the Walcheren expedition was associated with a dry and sandy soil. He then discusses malaria as observed in Wellington's peninsular campaigns in Spain, and concludes that "malaria and the products of vegetable decomposition are two different things." The questions of altitude and seasonal incidence are next discussed. Malaria may be an acutely fatal disease, or an extremely chronic one; in endemic areas it attacks strangers and new-comers rather than the indigenous population. The West African negro is relatively immune—a fact confirmed by many subsequent observers. Swamp is not necessarily associated with malaria, and the Dismal Swamp on the frontiers of South Carolina and Virginia, 150,000 acres in extent, is entirely free from malaria.

The author next passes to consider the periodicity of malaria fever; is this related to a periodicity on the part of the patient or of the invading cause of the disease? Malarious districts are notoriously most dangerous at night; malaria loves the ground, it tends downwards; it is frequently conveyed by the wind; its incidence is diminished by cultivation. Splenomegaly is next dealt with.

There follows next the most interesting portion of the two chapters. Dr. Graham, Professor of Botany at Edinburgh, had a brother who was friendly with the Professor of Natural History at Cremona. The latter had read both in Hippocrates and Celsus of the *beneficial* effects of malaria in certain patients:—

"An ague in the spring, is physic for a king." Having a patient suffering from epilepsy, he sent him to spend a few nights in a part of the Pontine marshes where he was certain to contract malaria. He did so; the malaria was allowed to remain untreated for six months; he was then treated with Peruvian bark, and the patient became cured of both his malaria and his epilepsy. Here, in this quaint old book nearly a hundred years old, we have a clear anticipation of the present-day rôle of malaria therapy in the treatment of mental disorders.

Turning to treatment, the author insists on calomel *plus* cinchona bark. Opium, emetics, and blood letting are next considered, but he finally concentrates on "quina" treatment *plus* arsenic. The cinchona must be continued for at least a fortnight after the patient has been free from clinical symptoms. A curious remedy which appears to have some success is the web of the black spider. Finally, one may remark of the section on prophylaxis that it might almost have been written yesterday.

And so we may leave Dr. Watson, a man whose wonderful treatise must have constituted a notable contribution to the progress of medicine in his day. His two chapters on malaria are of amazing interest for their wealth of clinical and epidemiological detail; to read them a century later, with our later knowledge of the ætiology and causation of the disease, is to recognise how accurate and careful is the account. Above all, his suggestion of malaria therapy in mental diseases appears to have been an early and now forgotten anticipation of a later and greater discovery.

Treatment of Lobar Pneumonia by Felton's Serum. (A Preliminary Report based on Fifty-eight Cases.)

By JOHN COWAN, R. CRUICKSHANK, D. P. CUTHBERTSON, JOHN FLEMING, and A. W. HARRINGTON.

(Abstracted from *The Lancet*, Vol. CCXIX, December 27th, 1930, p. 1387.)

WHEN it was recognised that more than 90 per cent. of the cases of pneumonia were due to infection by

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the pneumococcus it was hoped that a specific antiserum might help in the treatment of the disease, but until recently the available sera have proved of little value.

Extensive investigations have thrown light upon the subject. Researches carried out in South Africa and in New York showed that there are several distinct serological types of pneumococci, and that antisera agglutinate their homologous strains and protect susceptible animals against infection by them. Three specific groups of pneumococci are recognised: Types I, II and III. Strains which do not fall into these divisions are classed together in a heterogeneous group IV or "x." Cooper and others have now shown that group "x" may be subdivided into a large number of specific types. To date some 22 different serological strains have been recognised.

Types I and II are responsible for 50—75 per cent. of the cases of pneumonia, but the exact proportion varies in different places at the same time, and at different seasons in the same place. Type III is the least common but the most virulent; group "x" is more common and less virulent than III; the virulence of I is about the same as "x," while that of II is intermediate between these and III.

The first requisite in the treatment of pneumonia by antiserum is the detection of the type of pneumococcus active in the particular case; the second is the supply of the corresponding antiserum, for it is useless to administer an antiserum which does not correspond to the active organism. At present effective antisera are only available for Types I and II pneumonias, but these infections constitute more than half the cases. The serum is antibacterial, not antitoxic—the pneumococcus has no demonstrable exo- or endo-toxin—and its function is to supply opsonins, agglutinins, precipitins, etc., which hasten the phagocytosis and destruction of the pneumococcus. It does *not* cause quicker resolution of the pathological lesions in the lungs, prevent death from cardiac failure or anoxæmia, neutralise non-specific poisons in the blood, or obviate the necessity for surgical interference in empyema.

The detection of the infecting type is a task which necessitates the loss of valuable time, typing from the sputum requiring nearly 24 hours, and from blood or lung cultures even longer. This is unfortunate, for the success of serum treatment is well known to depend upon early administration. Our practice, in consequence, has been to institute serum treatment as soon as the clinical diagnosis is made in every case of pneumonia, and to continue until the patient is better or we know that the type of organism is other than I or II.

The series now recorded is too small for any definite conclusion as to the value of serum treatment in pneumonia to be reached, but in view of the importance of the subject we present our present figures for the consideration of the profession. Our results are gratifying in so far as they suggest that the use of serum has lessened, to an appreciable amount, the mortality of the disease in our practice, but too much must not be expected from serum treatment. Death, in pneumonia may result from many causes, cardiac and respiratory failure, intoxications other than pneumococcal, or complications, side-issues of the infection, or the result of associated infections, or antecedent visceral disease. Against these the serum has no direct response.

Causes of Death in Pneumonia.

In pneumonia death may result from cardiac failure, anoxæmia, intoxications, or complications.

Cardiac Failure.

The exact causes of cardiac failure are not yet accurately appreciated. It is true that granular, fatty, and hyaline changes are usually found post-mortem in the myocardium, and that inflammatory changes are common. It is recognised that additional strain is thrown upon the right heart by the consolidation in the lungs, and that the blood pressure falls, sometimes to an extraordinary degree, during the course of the disease, but it is not clear how much of the circulatory difficulties are due to failure of the *vis a tergo*, and how much to disturbances in the peripheral circulation, from vasomotor paresis. Both factors must be borne in mind. In any case it is essential to lessen the strain upon the heart from the commencement of the illness.

The chief indications are rest in bed and full nursing. Sleep is required, and there must be no hesitation in securing it, if necessary, by the help of sedatives, of which we have found morphia given hypodermically the most helpful. It is true that its administration has been shown to lessen the respiratory rate to a slight extent (5 per cent.), and in consequence the oxygenation of the arterial blood, but this contra-indication is of less moment than the absence of rest and sleep, and can be remedied by the measures suggested for the treatment of anoxæmia. The occurrence of pleural pain is an additional indication.

Food, too, is essential and must be fluid. Diluted milk forms the staple, and readily digested carbohydrate (Horlick, Benger, etc.) can be added, or sugar in weak tea or coffee. Any distension of the abdomen must be remedied by alteration of the diet, and the use of rectal tube, enemata, and pituitrin.

Stimulants are generally required at some stage of the illness. Alcohol is said to be inert as a cardiac stimulant, but its effects in dilating the superficial vessels of the body and so increasing the heat loss, depressing the higher cerebral centres and so tending to ensure rest, and as a food which needs no digestion, are often useful. It should always be given to alcoholics. If the pulse lessens in rate and increases in value, if cold extremities tend to warm, if restlessness and delirium decrease, and the tongue becomes more moist, its administration is proving helpful (Murchison). The digitalis group are useful in moderate doses, and can be aided by caffeine and theobromine. Pituitrin should be exhibited if there are any suggestions of vasomotor failure.

Anoxæmia.

The appearance of cyanosis is a clear indication of the presence of anoxæmia which occurs, to some extent, in every case of pneumonia. It is due to the lessened pulmonary area, the passage of blood through unaerated pulmonary capillaries, the lessened diffusion of gases from exudate in the pulmonary alveoli, and the shallow breathing which characterises pneumonia. It may be augmented in special cases by the existence of other pulmonary troubles such as bronchitis and pleural effusion. It has been shown by arterial puncture that anoxæmia may be extreme, the oxygen saturation being reduced to 60, 50, 40 per cent., or even lower, and that the administration of oxygen remedies the fault quickly and successfully. We have all seen such treatment remove, or at any rate lessen, cyanosis.

If the administration of oxygen remedies anoxæmia, anoxæmia should not be permitted to arise. In the past oxygen administration has been offered too late. Oxygen should be given in suitable amount continuously throughout the illness.

We have not had the opportunity of using an oxygen chamber. With it a concentration of 40—50 per cent. is used, generally the lower figure, with beneficial results. A concentration of 60 per cent. is deemed unsafe, but 40 per cent. has no ill-effect upon healthy persons sleeping under its influence. We have had to use other methods, Haldane's mask if possible, or the nasal tube. If these prove impracticable from delirium, etc., we exhibit oxygen freely through a funnel suspended above the patient's mouth. In consequence in this series cyanosis has rarely been severe.

The Intoxications.

The intoxications of pneumonia are only in part due to the specific poisons of the pneumococcus, for it seems clear that anoxæmia and autolysis of the pulmonary lesions must interfere with normal metabolism. The prompt removal of these abnormal products is indicated and can be facilitated by increased elimination through the bowel, the skin, and the kidneys. The first

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indication is the supply of sufficient fluid which may be given with the milk or separately as lemonade, soda water, etc. We have, too, regularly administered potassium citrate (80—160 grains per diem) and liquor ammonii acetatis (4—8 drachms). The ammonia increases the formation of urea which acts as a diuretic, while the potassium salt also augments the urinary output, and, in addition, tends to increase the available alkali of the blood (Cushny).

It is impossible in this paper to discuss in full the vexed question of the acid-base balance in pneumonia. It has been known for long that in pneumonia there is as a rule a diminution of the CO_2 content of the arterial and the venous blood, though there is no appreciable lessening of the CO_2-combining powers of the blood. Various observers, using electrometric methods or indirect methods of measuring the pH of the blood, have concluded that it lies either within the somewhat discrepant range of normality or is definitely shifted towards the alkaline side. On the other hand, it has been repeatedly shown that the urine during the febrile stage of the disease is definitely acid, from an increased excretion of organic acids and acid salts. The ammonia output, too, is also increased.

In this series, in which alkalis were being exhibited, the reaction of the urine was noted accurately in 34 patients who recovered from the illness. The urine was alkaline to litmus before the termination of the fever in 9 cases; on the day of termination of the fever in 6 cases; on the first day afterwards in 6 cases; on the second day in 4 cases; on the third day in 4 cases; and subsequently in 5 cases. In 4 fatal cases the urine was alkaline before death.

On the available evidence we are inclined to trust the physiological evidence of the kidneys, which are clearly compensating an increased acidity of the tissues, rather than the evidence of the chemical examination of the blood. We continue the administration of the above-mentioned drugs for several days after the cessation of the fever, as it is known that the increased nitrogen output continues for several days after the fever has passed.

The Pneumococcal Intoxication.

On the admission of a patient blood is at once taken for culture and, immediately afterwards, a dose of 10,000 units of Types I and II serum is given intravenously. As a rule we have given a similar dose every eight hours until the fever fell below 102°, but we have not adhered strictly to the rule, giving more or less frequent doses according to the general condition of the patient rather than to the height of the fever. The signs of toxæmia, delirium, exhaustion, incontinence, etc., are more dependable criteria. In all we have given 348 doses to 58 patients, an average of 6, the extremes being 26 and 1.

We have not followed the bacteriological evidence as to type strictly, for we have found that the first examination of the sputum is not necessarily correct, presumably from contamination by bacteria derived from the mouth where, as is well known, pneumococci, most frequently group "x," are often present in healthy individuals. In one early case, which ultimately proved fatal, we unfortunately ceased administration of the serum on the sputum report of a group "x" infection, until the results of the blood culture proved that the infection was Type II. Cultures from the blood or lung are more likely to be accurate. Latterly we have continued the use of serum in every case until satisfied by *repeated* examinations that the infection was *not* Type I or II.

In 4 cases the sputum report was group "x," while blood culture showed Type I in 2 cases, and Type II in 2 cases. In 3 cases with negative blood cultures the first sputum reports were group "x," subsequent examinations showing Type I in 1 case, and Type II in 2 cases.

The administration of large doses of serum, intravenously, necessarily entails the risk of anaphylaxis, but the Felton serum is manufactured in such a way as to minimise this risk. It is derived from the serum protein of immunised horses by precipitation of the globulin antibody-carrying fraction in a large bulk of distilled water, the precipitate being redissolved in concentrated solution so that the therapeutic dose measures about 10 c.cm. A conjunctival test of sensitivity is made before the first injection.

In this series anaphylactic phenomena occurred in six cases. Immediate reactions occurred in two cases, succeeding the administration of the first dose. The patients became very short of breath and cyanosed, and the pulse failed, but these symptoms rapidly disappeared on the exhibition of adrenalin and atropine. In one case a second dose produced a similar but less severe reaction; the other patient did not require a second dose. In two cases urticarial eruptions were noticed a few hours after the first dose of serum. Late reactions occurred in two cases. In one patient who had had ten doses pyrexia, accompanied by arthritis, ensued on the twelfth day of illness and persisted for seven days. In the other case pyrexia, accompanied by inguinal adenitis, occurred on the fourteenth day of illness and persisted for eight days. This patient had had 11 doses, all given through the veins of the arms. Neither patient was acutely ill.

Discussion.

During the period of this investigation 60 cases of pneumonia were admitted into the wards. Of these, three patients were not given serum, for various reasons; they all made a good recovery. The other 57 patients were given serum. To these we have added another case, admitted in December 1929, who received serum which had been presented to us by Dr. Bullowa. Of this series of 58 cases one patient (Type III) died within 24 hours of admission. The others survived for at least 48 hours.

This series of cases is too small for any accurate conclusion as to the value of the treatment to be reached. We have no definite standard for comparison, but we show the results in an *untyped* series treated by us in the same wards during the last 20 years.

MORTALITY.

	Without serum.		*With serum.*	
	Cases.	Deaths. %	Cases.	Deaths. %
All cases	856	158 (18.46)	58	6 (10.3)
Males	633	127 (20.06)	38	6 (15.7)
Females	223	31 (13.9)	20	0

The Use of Mechanical Measures in the Treatment of Obstinate Oedema.

By E. F. BLAND, M.D.,
and
P. D. WHITE, M.D.

(Abstracted from *The Journal of the American Medical Association*, Vol. 95, No. 20, November 15th, 1930, p. 1489.)

THE treatment of severe and refractory œdema of the lower extremities has occupied the attention of physicians for many centuries. The celebrated Roman philosopher Celsus, of the first century A.D., in a chapter on "De Hydropicis," called attention to the beneficial effects of a low fluid intake as well as to the increased elimination of fluid by excessive sweating; but in addition to these measures it is of considerable interest to find the following recommendation given by him for the treatment of dropsy: "Above all an incision ought to be made, of almost four fingerbreadths, on the inner side (of the leg), from which much fluid may drain for several days." Although even to-day this original recommendation of Celsus is occasionally resorted to, more appropriate measures are now available.

Great progress has been made during the last fifty years in the direction of a better understanding of cardiac and renal disease. The realization of the

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importance and of the rational use of digitalis in patients with early congestive failure, the introduction of the caffeine diuretics, and more recently of merbaphen (novasurol) and mersalyl (salyrgan), have proved very efficacious in the prevention and control of anasarca. However, in spite of these measures, a case of extreme œdema is occasionally encountered that resists all efforts at medical control. It is this type of case that we shall consider here, calling attention to the numerous procedures that have been employed for combating such a distressing situation, in particular one which, although introduced more than fifty years ago by Reginald Southey, has largely been forgotten. We believe that this measure proposed by Southey has a definite place in the treatment of patients with obstinate œdema.

By the mechanical removal of considerable quantities of excessive œdema fluid, one may hope to accomplish a threefold purpose: in the first place, by reducing the size of the distended parts, the patient is made more comfortable; secondly, the already overtaxed and failing circulatory system is relieved of an additional burden; and, finally, the partial removal of what has been called by Galli the "peripheral barrier" to the circulation favours a more adequate resorption of the remaining fluid by subcutaneous veins and lymphatics when these have been embarrassed by the pressure of the œdema fluid.

Of the local measures that have been employed in the treatment of œdema in general, we shall discuss briefly the ones that to us seem of greater interest. They fall into three groups:

1. In relatively slight œdemas, such mechanical procedures as gentle massage and elevation of the part lessen the tension, make the patient more comfortable, and promote the absorption of the excess fluid. These measures, in addition to medical treatment, are usually sufficient to control the situation.

2. The application of hypertonic solutions, usually a dressing containing a solution of sodium chloride in glycerin, has been employed and recommended by Carnot, provided the skin is intact. Œdematous legs are said to shrink several centimetres in twenty-four hours. We have not attempted this, as it has appeared impracticable to us.

3. In the presence of a large amount of fluid, several surgical measures for its evacuation are available:

(a) Acupuncture, in which multiple small needle pricks are made into the œdematous parts, thereby permitting fluid to exude for several days, has been widely practised during the past century, and striking relief has been noted in numerous patients following the drainage of considerable amounts of fluid. However, as has been pointed out by others, all who have used this method are acquainted with the serious drawbacks attending ordinary puncture of the distended limbs. The fluid that drains away is difficult to collect and to control. The patient's skin is constantly exposed to an irritating and decomposing body fluid, which promotes infection and ulceration; erysipelas sometimes follows, may accelerate the patient's death and greatly increase the suffering of the last few days of life, while the constant wetting of the bedclothes keeps the patient damp and cold, and is an undesirable feature.

(b) Long, deep incisions have been employed by others and by this method as much as 30 litres of fluid is said to have been obtained in twenty-four hours. In 1927, Sépet used this procedure on fourteen patients and reported excellent results in all cases with the evacuation of much fluid, regression of the œdema, increased urination and improved cardiac action. It would seem, however, that except in rare cases this procedure is undesirable and that it may be attended by some danger to the patient. Rarely, in the past, even more heroic measures have been attempted, such as that recorded by Finch in 1823 in a "case of anasarca in which amputation was successfully employed, and the fluid discharged by it."

(c) Finally, what appears to us the simplest, safest and most desirable method of treating obstinate œdema of considerable degree is the one originally recommended by Southey. Although it is frequently mentioned in textbooks and occasionally in the literature, we have reason to believe that its value is not generally appreciated, and certainly not in America.

In 1877, Reginald Southey, a physician of St. Bartholomew's Hospital in London, realizing the limitations and dangers of the procedures previously employed, perfected a method of subcutaneous drainage by means of small capillary tubes which bear his name. The apparatus is simple in design and consists of a small metal trocar and cannula, the latter containing several lateral perforations permitting a free flow of fluid. In the handle of the trocar is a compartment in which additional cannulas are carried. The use of the instrument is not difficult. The skin at the sites selected for insertion, usually the outer and inner aspects of the lower parts of the legs, the dorsum of the feet, or the scrotum, is cleansed aseptically, a wheal is made with procaine hydrochloride, and a small amount of sterile ointment is applied to prevent local irritation. The trocar and cannula are inserted deeply into the swollen part; the cuff of the cannula is held firmly with a clamp while the trocar is withdrawn and a small rubber tube attached. Fluid wells up immediately and continues to flow in steady drops from the cannula until the rubber tube is in place; this, in turn, is led off to a suitable receptacle placed beneath the bed for the collection of the fluid. As many tubes may be used as seem desirable; we have found that two in each leg are usually adequate; they are left in place for from one to several days and cause surprisingly little discomfort to the patient. There is ordinarily no leakage about the cannula; the skin and dressing remain dry. Since the flow is constantly away from the site of insertion, the chance of infection is greatly lessened, and with an ordinary amount of care we believe that it is relatively slight. Following the removal of the tubes, a moderate amount of fluid may continue to drain for a few days, but the wounds heal without difficulty. Curshmann has designed a larger trocar and cannula to be used in the same fashion as Southey's apparatus, but it appears that in the majority of cases, certainly, the latter is adequate.

During a recent visit of one of us to the clinic of Sir Thomas Lewis in London our attention was directed, by observation of a certain case, to the excellent results that occasionally may be obtained by the employment of this procedure; 6 litres of œdema fluid were removed from the legs by Southey's tubes in three days with great symptomatic relief and objective evidence of improvement. The patient was a young woman with severe rheumatic heart disease, normal rhythm, and congestive failure with extensive anasarca.

We have encountered in the course of the past ten months in Boston eight cases of extensive œdema, several of which failed to respond adequately to medical treatment, and in these cases we have employed Southey's tubes in an attempt to relieve the anasarca. In seven of the cases the œdema was the result of congestive heart failure, and in one case it was secondary to an extensive abdominal carcinomatosis.

COMMENT.

The fluid from two of our patients has been analysed and compared with an analysis of the patients' blood serum by Dr. Frank Fremont-Smith, who finds that it resembles fairly closely cerebrospinal fluid, except for the higher protein content and the lower chloride content which go hand in hand.

One patient did not live a sufficient length of time to give the method an adequate trial. Of the remaining seven patients, one was not relieved and the use of the tubes resulted in a superficial infection which made the patient even more uncomfortable for several days but did not affect the ultimate prognosis. One patient was slightly improved until death two weeks later from bronchopneumonia; five patients were definitely relieved so far as the œdema was concerned, and the results in two of these cases were striking. From the nature of the cases selected for this procedure ultimate recovery is anticipated in only a small percentage; however, the mechanical removal of the

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excessive fluid may be a means of sparing the patient great discomfort, and occasionally it may even postpone indefinitely a fatal termination.

Others have used somewhat similar methods with successful results. DeStéfano has employed direct drainage by means of small platinum needles under the skin, and in his hands this method has proved effective and harmless in 100 cases. In one of his patients 27 litres was evacuated in forty-eight hours; in only one case was there a slight superficial infection, which subsided in the course of twenty-four hours.

SUMMARY AND CONCLUSIONS.

1. In eight cases of extensive œdema, mostly the result of congestive heart failure and resistant to medical therapeutic measures, we have employed Southey's tubes inserted into the œdematous subcutaneous tissue of the legs or scrotum. In two of our patients the results were strikingly beneficial, following the removal of 16 litres in the course of two days in one case, and of 9 litres in three and one-half days in another. In three patients there was moderate relief; in one case only slight improvement was noted; the remaining two patients were not relieved.

2. In suitable cases the use of Southey's tubes is a valuable therapeutic procedure, and we believe that the employment of this method as recommended many years ago by Reginald Southey should be revived.

Reviews.

BACTERIOLOGICAL TECHNIQUE: A LABORATORY GUIDE FOR MEDICAL, DENTAL, AND TECHNICAL STUDENTS.—By J. W. H. Eyre, M.D., M.S., F.R.S. (Edin.). Third Edition. London: Baillière, Tindall & Cox, 1930. Pp. xii plus 619, with 238 figures in the text. Price, 21s. net.

IT is with a feeling of considerable pleasure that we undertake the reviewing of this new edition of Eyre's *Bacteriological Technique*. It is nearly thirty years since the first edition appeared and during the whole of the intervening period this book has been the standard manual for the laboratory worker, not only in numerous medical schools throughout the British Empire, but in many research laboratories in India and other countries, and during the War the second edition, first issued in 1913, which was usually the bible of the young and little-experienced bacteriological specialist, found its way into many strange lands. It is characteristic of the reticence of the British scientist that he has kept us waiting so long for the third edition.

Even for the sake of those not familiar with this book it is scarcely necessary to enlarge on its scope. The title is sufficiently descriptive. It is not a dictionary of bacteriological technique, giving all the possible—and impossible—methods that might be employed, but for each circumstance a simple and sound technique is described. In some instances both the new and the older methods have been described. In these cases one has a feeling that the author does not like to desert methods which in the past have served him so well, and yet realises that the newer methods which are being universally adopted by his younger colleagues have definite claims to superiority. On the other hand, one knows that no technique that has not had a thorough trial has been described.

Two chapters, on the classification of fungi and on Schizomycetes, should be very useful for the non-medical technician to give him a more intelligent interest in the subject. We do not quite see why these two chapters did not come at the beginning of the book. In fact, if there is any criticism to be made, it is with regard to the arrangement of the subjects; it is very difficult to follow the reasoning which has led to the order that the author has adopted.

This book would form a very excellent companion to Topley and Wilson's two volumes on bacteriology, recently reviewed in this journal, from which the subject of routine technique was deliberately omitted. The format is good and the price is very reasonable indeed.

L. E. N.

FAUNA OF BRITISH INDIA. CESTODES. VOL. II. —By T. Southwell, D.Sc., Ph.D., A.R.C.S., F.R.S.E. London: Taylor & Francis, 1930. Pp. ix plus 262. Price, 15s.

THIS volume deals with the single superfamily *Tænoidea*, which is the sixth and last superfamily of the order *Eucestoda*. The other five superfamilies were dealt with in Vol. I, of this work, which has already been reviewed in our January number. *Tænoidea* contains practically all the Cestodes, the adult stages of which are found in mammals and birds, and as the number of parasites recorded from these hosts in India is fully representative of the group as a whole, it is a book whose value will be appreciated by workers in many other countries besides India. In a book of this nature the author of necessity has to draw largely on the work of others, but it is surprising to note what a large proportion of the drawings are original, indicating that he has personally studied much of the material described. This makes the book much more valuable as it shows that the original descriptions have been checked by a worker of considerable authority. The volume ends with two very useful lists of all the species in both volumes; these are a classified list of the cestodes with their hosts, and a classified list of the hosts with the cestodes found in each. In the review of Vol. I, the reviewer ended with the words: "If the second volume, which has not yet appeared, comes up to the standard of the first, the two together will make a work of reference which any systematic helminthologist can ill afford to be without." After reading Vol. II, we feel that the above sentence needs no qualification.

P. A. M.

FELLOWSHIP EXAMINATION PAPERS FOR THE DIPLOMAS OF THE ROYAL COLLEGE OF SURGEONS, EDINBURGH. 1927–1930. Edinburgh: E. & S. Livingstone. Pp. 42. Price, 2s. 6d.

THIS is a small paper-bound brochure, containing the questions set during four years in the single Licence examination, the Fellowship, and in optional subjects. It includes questions in anatomy, surgery and surgical anatomy, dental surgery, gynæcology, laryngology and allied subjects, obstetric surgery, ophthalmology, and surgical pathology. So many post-graduate students from India go to Edinburgh that this brochure will be of interest to many of our readers.

THE CATECHISM SERIES. MEDICINE, PART II; DISORDERS OF NUTRITION, OF THE KIDNEYS, BLOOD, AND DUCTLESS GLANDS. PATHOLOGY, PART V. CHEMISTRY, PART II. Third and Fourth Editions, Edinburgh: E. & S. Livingstone. Price, each volume, 1s. 6d., plus postage.

THAT these small brochures are popular is evidenced by the fact that the first two have reached a third edition and the last a fourth edition. The *Catechism Series* is now a very large one, containing in all some 57 brochures. These will be found useful by students revising for their final examination. They are well printed and got up, though the authors' names are not given.

PYE'S SURGICAL HANDICRAFT: A MANUAL OF SURGICAL MANIPULATIONS, MINOR SURGERY AND OTHER MATTERS CONNECTED WITH THE WORK OF HOUSE SURGEONS AND SURGICAL DRESSERS.—Edited by H. W. Carson, F.R.C.S. (Eng.). Tenth Edition. Bristol: John Wright & Sons, Ltd., 1931. Pp. 641, with 343 illustrations in the text and 22 plates. Price, 21s. net.

IT is a great pity that Carson did not live to see the tenth edition of this book in print. It has been

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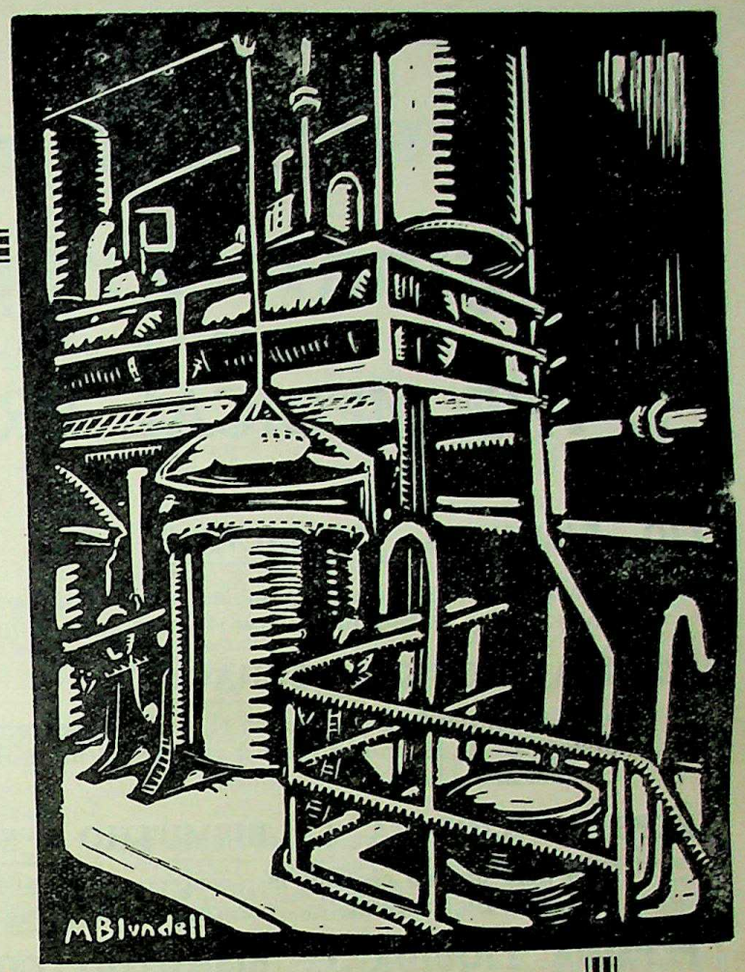

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thoroughly revised, new sections added and several parts re-written. But the size of the book has been practically kept the same. Many new and instructive illustrations have been added. The chapter on venereal diseases has almost been re-written. New sections which are of more interest are:—(1) On radium treatment of cancer. (2) On x-ray diagnosis. (3) Wounds of the hand. (4) The injection treatment of varicose veins. It is an excellent book well suited for young surgeons as well as house surgeons. It is a very valuable contribution by one of the great surgeons of the present century.

S. N. M.

DIET AND CARE OF THE SURGICAL CASE.—By R. H. Boyd, M.B., Ch.B. (N.Z.), T.R.O.S. (Edin.), with an introduction by C. C. Choyce, C.M.G., C.B.E., F.R.C.S. London: H. K. Lewis & Co., Ltd., 1930. Pp. 106. Price, 5s. net.

THIS is a handy little book. Although not complete, various methods have been collected and put together in a helpful way. It is written in a clear and simple style and is concise. The book will be useful to house surgeons, practitioners, and senior students.

S. N. M.

CANCER OF THE LARYNX.—By Sir St. Clair Thomson, M.D., F.R.C.S., F.R.C.P., and Lionel Colledge, M.B., F.R.C.S. London: Kegan Paul, Trench, Trubner and Co., Ltd., 1930. Pp. xxii plus 244. Illustrated. Price, 25s. net.

THIS book is a brilliant contribution to the literature on cancer of the larynx, and the whole story is a triumph for surgery. Fifty years ago cancer of the larynx was thought to be an incurable disease, to-day the achievements of British surgeons mainly, and of the authors in particular, have brought the surgical treatment of this "dire disease" to such a pitch of excellence that certain intrinsic varieties of cancer of the larynx are the most successfully treated of all cancers in the body. Great strides too have been made in the surgery of extrinsic carcinoma.

The book is written in a charming simple style and abounds with an amazing wealth of detail, and has everything to commend it as one of the most notable books of the year.

N. J. J.

BURNS: TYPES, PATHOLOGY AND MANAGEMENT.—By G. T. Pack, B.S., M.D., and A. H. Davis, B.S., M.D. London: J. B. Lippincott Company, 1930. Pp. xii plus 364, with 60 illustrations. Price, 25s. net or Rs. 18-12. Obtainable from Messrs. Butterworth & Co. (India), Ltd., Calcutta.

THE authors of this book have made a special study of burns. Indeed we learn in the preface that they have been fortunate in obtaining a wealth of material, "a fact that can be attributed not only to opportunity but to the horror and dislike of our colleagues for severe burns and scalds."

All those who have to deal with surgical emergencies know that badly burned persons call for all the skill, care and patience of both nurses and doctors, and frequently the results of treatment are far from satisfactory.

The experience of those who have specialised in the study and treatment of these injuries must therefore be valuable.

In a book of more than 300 pages the authors have fully discussed their subject. Commencing with the medical history of burns, the classification, pathological changes and the various methods of treatment are then described.

The chapters on treatment are of course the most important, and we regret that the authors were not more dogmatic in recommending specific methods in the various classes of burns. All the old and new forms of treatment both of the local injury and the general shock are there, but there is not much to tell us which of these have been found to be the most successful and which nowadays may be considered impractical and out of date.

We gather that the tannic acid method meets with approval, and we should like to see the technical details described more fully. A very important section deals with the treatment of the deformities resulting from burns. This is a branch of plastic surgery which is of the greatest importance. Burns by electricity, by chemicals and by radium and x-rays are described, and the final chapter deals with the medico-legal aspect of the subject.

The book should be very useful to the casualty officer. It is well printed and produced. The illustrations are good and numerous and the index is complete.

H. H.

DISEASES OF THE EAR.—By P. D. Kerrison, M.D. Fourth Edition. London: J. B. Lippincott Company, 1930. Pp. 627, with 332 illustrations in text and 2 full pages in colour. Price, Rs. 26-4. Obtainable from Butterworth and Co. (India), Ltd.

THIS important work has just passed through its fourth edition. It is devoted entirely to the ear, and in its 627 pages is to be found a masterly account, clearly expressed, of the diseases and treatment of this organ. Subjects such as the labyrinth and infections of the brain and meninges, which up till now have found little space in the ordinary textbook, are most elaborately dealt with, as many as three whole chapters being devoted to the former. The present edition has been brought thoroughly up to date and a new chapter on the training of the deaf mute is a welcome addition.

The book is a most excellent one and justifies its place in the modern literature on the ear.

N. J. J.

MODERN TREATMENT OF DISEASES OF THE THROAT, NOSE AND EAR.—By H. Lawson Whale, M.D., F.R.C.S. London: Jonathan Cape, 1930. Pp. 128. Price, 5s. net. Obtainable from Butterworth and Co. (India), Ltd. Price, Rs. 3-12.

THE author of this little work is to be congratulated upon the amount of useful information crammed into such a little space. The references after each chapter are very large in number and go to show the amount of reading that must have been necessary in the process of sifting.

The work places before the reader various methods of treatment practised at Home and abroad, and it is the author's intention to give the general practitioner a "reliable guide to the present state of opinion." This purpose has been fully achieved.

N. J. J.

CHRONIC NASAL SINUSITIS.—By Patrick Watson-Williams, M.D. Bristol: John Wright & Sons, Ltd., 1930. Pp. xvi plus 221, with 109 illustrations. Price, 15s. net.

THIS monograph on chronic nasal sinusitis and its relation to general medicine is divided into two parts. The first part is devoted to a description of the connection between nasal sinusitis, latent and otherwise, and diseases in far distant organs and systems of the body. Cases of insanity and suicide are traceable to sinus infection, and there is also a chapter on the influence of focal sepsis on mind and character. It is as yet to be proved in many instances whether focal sepsis is a cause, rather than an accidental association, of the widespread regional complications described. With what certainty can a clinician say to a patient that the removal of an obvious septic focus is going to cure him of disease in a far distant organ? One can only say here is a septic focus and it should be removed, the result, one must admit, is a matter of chance. By far the most numerous cases of blindness which are said to be due to sinus infections get well spontaneously, some get well after opening up of sinuses and a great many are unaffected by operations. How can we tell therefore that those cases cured by operations would not recover if left alone?

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The second part of the book deals with diagnostic methods and treatment. A feature is the elaborate description of diagnostic exploral suction of the nasal sinuses.

With regard to the method of examination one is forced to ask the question "How is one to be certain of asepsis in technique when working in a cavity normally abounding with organisms?" This monograph gives much food for thought and on this account is well worth reading.

N. J. J.

DISEASES OF THE NOSE, THROAT AND EAR.—By W. L. Ballenger, M.D., F.A.C.S. Revised by H. C. Ballenger, M.D., F.A.C.S. Sixth Edition. London: Henry Kimpton, 1930. Pp. 1138, with 583 engravings and 29 plates. Price, 50s. net.

THIS notable work on the diseases of the ear, nose and throat has passed through six editions and that itself is proof of its great popularity. There is not a great deal of difference between this and the last edition. The chapter on endoscopy by two such well known authorities as Tucker and Jackson is a welcome addition, and is extremely clearly written, enhancing greatly the attractiveness of the work.

Another feature is the clear exposition of the functions of the labyrinth and the labyrinthine tests and the indications for labyrinthine operations. The whole work is an extremely valuable one, well got up, with plenty of excellent illustrations; it ought to find room in the library of the specialist.

N. J. J.

NASAL CATARRH.—By W. Stuart-Low, F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1930. Pp. x plus 84, with 13 illustrations. Price, 5s. net.

IT is the author's aim to show "after many years of practice" that chronic nasal catarrh is due mainly to nasal obstruction and secondly that nasal catarrh is a curable condition. These reasons do not appear sufficient cause for the writing of a book. It is common knowledge that nasal obstruction is a predisposing cause of nasal catarrh. It is also common knowledge that certain forms of catarrh are curable, that others even after the most elaborate operations are not.

It is *not* clear for which class of medical reader this book is written; if for the general practitioner, as it appears to be, one is forced to say, that the information given in its 84 pages is so scrappy as to be of little use.

N. J. J.

THE NOSE, THROAT AND EAR AND THEIR DISEASES.—Edited by C. Jackson, M.D., Sc.D., LL.D., F.A.C.S., and G. M. Coates, A.B., M.D., F.A.C.S. Philadelphia and London: W. B. Saunders Company, 1929. Pp. xvi plus 1177, with 657 illustrations and 27 inserts in colour. Price, 60s. net.

THIS textbook is a systematic treatise on the diseases of the ear, nose and throat, and deals very comprehensively with the subjects under discussion. It is written by various authors and so becomes at once more a book of reference and one for the specialist rather than a textbook for students.

It is a large work and well got up and presents the last word on otorhinolaryngology as practised on the continents of America. Several new methods of examination are described. It is for instance interesting to read of tonsilloscopy, a method by which the tonsil is transilluminated and a diagnosis of the pathological condition made by the colour shown up by the transilluminating lamp. By this means it is possible to tell of the presence of pus or detritus in the organ. The method appears however to be of doubtful value, since there are other and more certain ways of distinguishing a diseased tonsil from a healthy one.

The chapters on the tracheobronchial tree and larynx are particularly good. The book forms excellent reading and there are plenty of good illustrations, and it is one that can be well recommended as an admirable work of reference.

N. J. J.

DEAFNESS AND ITS ALLEVIATION BY OPERATION.—By V. Nesfield, F.R.C.S. (Eng.), Major, I.M.S. (Retired). Second Edition. London: H. K. Lewis and Co., Ltd., 1931. Pp. vii plus 170, with 20 illustrations. Price, 10s. 6d. net.

THE second edition of this work is far more pretentious than the first which came out in 1928. This edition aims somewhat at being a sort of textbook, for in addition to the main theme which is to describe an operation for the alleviation of deafness and its results, it has chapters on Eustachian catarrh, tinnitus aurium and the surgical removal of adenoids and tonsils.

We note that with regard to the latter operation the author is not in accord with modern teaching, for on page 123 he states that he is convinced that in children "the only right method is to *remove* them with the blunt guillotine and never to dissect or enucleate them." In adults the tonsils, presumably their projecting portions, are snared.

The "pièce de résistance" of the work is the operation which the author describes. It is one by which a hole is bored through the mastoid into the middle ear with the idea that the "only one main thought in the treatment of deafness is to produce a free airway to the middle ear." But how does the author account therefore for all those numerous cases of old standing profound deafness in which the Eustachian tube is freely patent, and in which the middle ear is well supplied with air? As regards results, one has yet to be convinced. Case No. 3, Miss B., is described in both the 1st and 2nd editions. In the 1st edition it is said of this case that the patient had to go to a lip reading class to improve her apparent hearing after operation, whereas in the second edition these words are omitted in the description of this very same case.

N. J. J.

GONOCOCCAL INFECTION IN THE MALE.—By Abr. L. Wolbarst, M.D. Second Edition, completely Revised and Enlarged. St. Louis: The C. V. Mosby Company, 1930. Pp. 297, with 147 illustrations, including seven colour plates. Price, $5.50.

THE first edition of this book appeared in 1927 and was favourably noticed in this journal as a most useful practical manual. It was intended primarily for the practitioner and hence more stress was laid on methods of diagnosis and treatment than on the pathological anatomy of the disease. In the present edition the general character of the work is unchanged, but it has been considerably expanded and many sections have been entirely rewritten. No great advance in the treatment of gonorrhœa has been made since the last edition appeared, but the tendency to abandon the vigorous assault upon the local seat of the disease, popularised by the French school, and to regard it as a constitutional disease, in which the main aim of treatment, in the early stages, is to assist the reparative forces of the body, is gaining ground amongst urologists. The author has never been in favour of the routine use of irrigations in early cases and his further experience has confirmed him in this view. The line of treatment described is one which in the reviewer's experience gives a high percentage of freedom from complications, but if later sequelæ in the form of gleet of anterior or posterior urethral origin is to be avoided, the necessity of early dilatation of the urethra and prostatic massage, even in cases showing no signs of involvement of the posterior urethra, must never be lost sight of. Special features which we selected for comment in the last edition were the beautifully illustrated section on the "glass tests" in acute and chronic urethritis, the excellent descriptions of the appearances to be seen with the posterior urethroscope in chronic cases and the chapter on the use of diathermy, though

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one must differ from the author's view that it can do no harm to try it in acute anterior urethritis. Belfield's operation, which is more popular in America than in Europe, is ardently advocated as the best, if not the only, treatment in acute arthritis and in chronic seminal vesiculitis. It is surprising to find no mention of detoxicated vaccines, though in the hands of many workers they have given results much superior to those obtained with ordinary vaccines. All the instruments used in diagnosis and treatment are described and figured, though we miss a description of the inflating internally-illuminated type of urethroscope used by most workers in England, and generally found to be easier to work with than the type here described.

We can strongly recommend this book as a sound guide to treatment for the practitioner and the specialist.

W. L. H.

SEX AND DISEASE.—By R. V. Storer, M.R.C.S., L.R.C.P. Fourth Edition. London: John Bale, Sons & Danielsson, 1931. Pp. 150. Illustrated. Price, 4s. 6d.

THIS small book is one which medical men will be glad to know of. In brief compass it informs the lay reader, whether young man or young woman, about venereal diseases, their dangers, their treatment, and prophylaxis. The first edition was published in Australia in April 1929, and the fact that the present—fourth—edition has been published in London is sufficient testimony to the need for the work.

Part I deals with sex and disease in general, the sex education of youth, the prevalence of venereal diseases, legislation in connection with venereal diseases, and personal prophylaxis. Part II deals with syphilis, and Part III with gonorrhœa. The instructions are given in clear and simple language, and the book is exactly what is wanted for the medical practitioner to recommend to his young patients of both sexes. The only point of criticism that we should like to make is that the reproduction of *Treponema pallidum* as seen under the darkground on p. 102 is capable of considerable improvement; it is curious that there are so few satisfactory illustrations of this subject in the literature—the best are those by Noguchi in the *Journal of Experimental Medicine* for 1912.

R. K.

THE CLINICAL INTERPRETATION OF AIDS TO DIAGNOSIS. VOL. I.—Published by The Lancet Limited, 7, Adam Street, Adelphi, London, 1930. Pp. lv plus 380. Illustrated. Price, 10s. 6d. net.

ONE of the most useful series of articles that has appeared in any medical journal for some time has been the *Lancet's* series on "Clinical Interpretation of Aids to Diagnosis." These articles are written usually by the worker on the special subject and sometimes by the physician or surgeon, but from whichever aspect it is treated the subject is dealt with in a practical manner and from the point of view of the intelligent general practitioner. How frequently one hears the bitter complaint of the laboratory worker who marvels that a practitioner with such high qualifications could be so unintelligent as to send such a hopeless specimen for examination! And then, later, hears the same practitioner, a first class man at his job, complaining that laboratory examinations never assist him at all, or that he cannot understand a word of the jargon of the laboratory report! The tendency of the specialist worker and the general practitioner is always to drift apart and every effort to keep them together and to make each understand the point of view of the other should be encouraged as it will have to be continued into the millennium.

It was the almost inevitable sequel to the appearance of the articles that they should be published in book form, but nevertheless the editors of the *Lancet* are to be congratulated on the form in which they have presented them. The short summaries at the beginning of each chapter are extremely helpful, and though, as we are told in the preface, a last-minute suggestion they add very considerably to the value of the book.

There are 45 articles on subjects ranging from "the interpretation of the Wassermann test in adults" to "the interpretation of mental tests." It is out of the question to give a list of the titles here and it would be unfair to discuss any single one of them. They vary somewhat in clarity of expression, but on the whole the standard is very high. One, at least, of the contributors has a refined sense of humour; by way of recommending the investigation about which he has written he tells a story of an elderly lady who had suffered from a complaint for 15 years. Her medical advisor had not taken a serious view of her condition, but decided to have her case investigated by the particular method which the contributor under discussion is writing about. The result was that a diagnosis of a very serious condition was made "which completely reversed the prognosis, and the patient died suddenly a month later." Can you imagine a greater triumph for medical science! We are left to guess whether it was treatment, the shock, or just chance which precipitated her death, but at least the poor old lady had the satisfaction of dying with a diagnosis.

This volume and the one that is to follow should be on the shelf of every general practitioner and it need only have one or two other books as its companions. It is a very well-printed and well-bound book, and it is difficult to see how it has been produced at the price. The pre-publication price for the second volume is even lower and we recommend practitioners to order it immediately.

L. E. N.

TEXTBOOK OF PATHOLOGY.—Edited by E. T. Bell, M.D. London: Henry Kimpton, 1930. Pp. xxviii plus 627. Illustrated with 316 engravings and 2 coloured plates. Price, 36s. net.

THIS book is the result of the combined efforts of six professors at the medical school of the University of Minnesota. The writer in his introductory chapter discusses the division of medical science which come under the broad heading of pathology and he quite rightly points out that what is usually meant by pathology is pathological anatomy, and not pathological physiology; the latter properly speaking includes the whole subject of clinical medicine. Other divisions of the science are comparative pathology and experimental pathology. This is definitely a book on pathological anatomy. The book has not been divided into the two distinct sections of general, and regional or special pathology as is the usual practice, but each of the separate chapters could be classed as falling into one or other of these divisions. The arrangement adopted is a perfectly satisfactory one.

The medical curriculum is one of the banes of authors and editors. It is the cause of upsetting both the balance and the homogeneity of medical books. The blood may be considered as an organ and there is therefore some excuse for the inclusion of the section on blood diseases with its preliminary description of the normal blood, but the same excuse cannot be made for the chapter on animal parasites. The description of the life cycle of the malaria parasite and the rest of this short chapter, which might well be entitled "Jottings on Protozoology and Helminthology," seem to be entirely out of place in this book. Then again in the chapter on the spleen there is a paragraph on histoplasmosis. The nomenclature and systematic position of the causative organism, *Histoplasma capsulatum*, is a very uncertain one and in any case, according to the writer of the chapter, only 4 cases have ever been described; yet the pathology of the spleen in this infection is given as much space as that in such widespread diseases as malaria and kala-azar. In each case it is the medical curriculum and not the writers who are mainly to blame, though in the latter instance a little better sense of proportion might have been displayed. The reticulo-endothelial system does not appear to have had the attention commensurate with

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the importance which recent work has indicated that it possesses.

On the whole it constitutes a very useful textbook for students and teachers. The descriptions are clear and the illustrations excellent. It is published in the form of a handy well-bound volume.

L. E. N.

ROSE AND CARLESS' MANUAL OF SURGERY.—By Cecil P. G. Wakeley, F.R.C.S. (Eng.), F.R.S. (Edin.), and John B. Hunter, M.G., F.R.C.S. (Eng.). Thirteenth Edition. London: Baillière, Tindall & Cox, 1930. Pp. 1592, with 19 coloured plates and X-ray supplement, and 664 text-figures. Price, 30s. net.

THE present edition marks an epoch in the long history of his popular textbook, in that Mr. Carless retires from active participation and Mr. Wakeley becomes the chief editor with Mr. John Hunter as his collaborator. Dr. Carnegie Dickson has revised the earlier chapters, dealing with bacteriology, inflammation, etc.; Mr. V. E. Negus has brought up to date those chapters dealing with the surgery of the ear, nose and throat and Mr. Bishop Harman has written the chapter on the surgical affections of the eye. Another new feature, which will appeal to readers in India is the chapter on tropical surgery by Sir Frank Powell Connor, a condensation of his well-known textbook, recently published. The Radiographic Supplement by Dr. Graham Hodgson, a collection of beautiful reproductions of typical radiograms, is a valuable addition to the work. In spite of many additions the bulk of the work has been but slightly increased, though the pages are a little larger and the style of the binding has been slightly changed. The task of the reviewer in dealing with a work of such established reputation as this is easy; he has only to see whether the recent advances which have been accepted by all surgeons find a place. In this respect there is little fault to be found. The book is well abreast of current teaching in most respects, for instance we find the tannic acid treatment of burns described and an excellent concise article on the use of radium in surgery, which adequately represents the present position. Still there are some points in which there is room for improvement, especially in the sections dealing with venereal diseases; the old course of treatment said to be recommended by Army surgeons, consisting of three injections of N. A. B. distributed amongst a series of courses of mercury has long ceased to be used by Army surgeons or by anyone else and it is high time it disappeared from textbooks. Directions for a modern course of arsenical and bismuth treatment for syphilis should take its place, and a section should be added on the toxic reactions liable to follow the administration of arsenical preparations and their prevention and treatment. The present short paragraph is quite inadequate, nor should students be taught that bismuth is to be considered as an adjunct in cases where mercury is not tolerated. The article on orthopædic surgery is placed too early in the book and leaves all the most interesting parts of the subject, such as stiff joints, ankylosis, deformities following old fractures, to be dealt with elsewhere, though nowadays these cases are considered to come within the province of the orthopædic surgeon. The operation of extra-articular arthrodesis which is becoming so popular in the treatment of tuberculous joints should now be included in all standard works. The views of the authors on the treatment of appendicitis are not those held by the majority of surgeons, to treat cases on medical lines up to forty-eight hours and then operate on those which have not responded well is surely not modern teaching. The section on liver abscess contains the usual old directions about operating on these cases, but the wrong impression of the treatment usually employed for this condition which is thus conveyed is corrected in Sir Frank Connor's section, to which readers in search of information on this subject will surely turn. The account given of the ætiology of chronic cholecystitis is not the teaching which is now current, but it must be admitted that all surgeons do not subscribe to Wilkie's views; in the matter of operation for hæmorrhoids however there is general agreement that Whitehead's operation, which is here recommended as the best in bad cases, is not the best or safest procedure. Having drawn attention to these few points one hastens to add that the book worthily represents the present position of surgery and that the student who has mastered the contents of its 1500-odd pages could face any examination with confidence, even for the higher degrees. It forms a sound basis on which to build up by study of special works.

To one who, as in the case of the present reviewer, was brought up on this book, it is a great pleasure to see it, now about double the size it was thirty years ago, still the outstanding and unbeatable textbook of surgery for students.

W. L. H.

Annual Reports.

ANNUAL REPORT FOR 1929 OF THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH, JOHANNESBURG. BY SIR SPENCER LISTER, LL.D. (CAPE), M.R.C.S. (ENG.), L.R.C.P. (LOND.). PUBLISHED BY SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH, 1930.

THIS report, as usual, contains much interesting matter and information which is applicable to Indian conditions. An epidemic which broke out in gerbils in the De Aaar district resembled plague, but was ultimately shown to be due to infection with a different type of Pasteurella organism—*Pasteurella desmodilli*, as it has been named. An investigation into the pollens responsible for hay fever in South Africa is in progress, and much information has been collected. It is of interest to note that orris root, which is present in almost all face powders, may cause allergy, and at a dance it may not be sufficient for the lady to take to some different kind of face powder free from orris root, because there may be sufficient floating in the atmosphere to bring on symptoms; the only thing to do in such cases is to de-sensitise the patient with an orris root extract.

A dermal test with an antigen for ankylostomiasis was tried out, but the results were not satisfactory. Pneumonia being such an important disease on the Raand, the typing of pneumococci was continued, group "M" is especially associated with pneumococcal meningitis. There is considerable evidence to show that lobar pneumonia may begin as a lung infection with a filterable virus, followed by secondary infection with the pneumococcus or streptococcus. One clear case of lobar pneumonia was due to the pneumobacillus of Friedlander.

In the department of industrial hygiene, special attention is paid to "dusty trades," dust inhalation, and deep mine ventilation of the gold mines. The inhalation of free silica particles not only predisposes to pulmonary tuberculosis, but also may lead to an allergic condition to such particles.

Dr. Annie Porter has studied the rôle of cockroaches in spreading hookworm infection, and finds that the large cockroach—*Periplaneta americana*—can pass undamaged ova and larvæ through its gut. Cyanide sand—a product of the settling tanks in the gold mining areas—may prove efficacious as a means of sterilising soil of hookworm larvæ. Dental caries has been found to be not uncommon even in the most primitive types of African races, and the subject is being fully investigated. Much work has also been done on Rous' fowl sarcoma, the possibilities of the use of bacterial toxins, the heavy metals, and dyes such as fluorescein having been investigated.

The routine work included the examination of 101,098 specimens. Diphtheria is fairly prevalent, 17 per cent.

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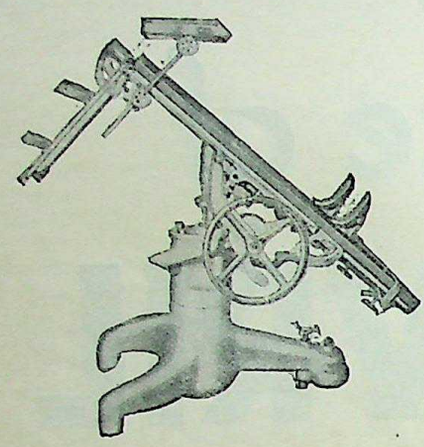
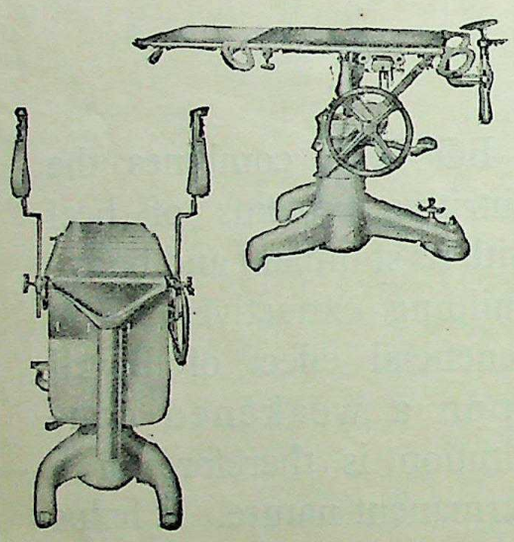
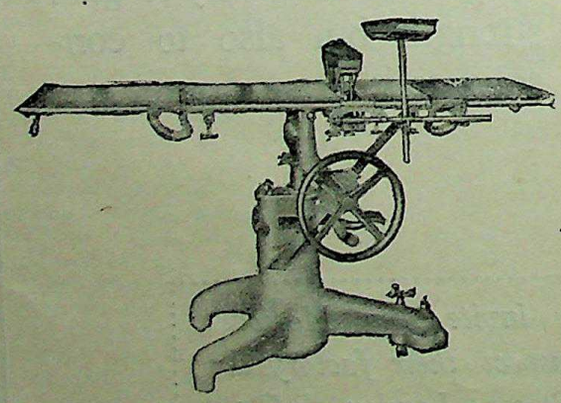
St. Bartholomew's Hospital Operation Table







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of throat swabs examined being positive. Dysentery due to the bacillus of Flexner is prevalent in the summer month of November. In the Widal test it is important to recognise the existence of non-motile "O" strains and to include these when carrying out the test. The issue of capped phials containing sterile ox bile for inoculation with 1 to 2 c.c. of the patient's blood greatly improves the cultural diagnosis of enteric fevers during the first week. Even where a blood sample is sent, it may be possible to recover the bacilli by taking a culture from the blood clot. In suspected leprosy the forcible injection of a minim or two of sterile saline into a suspected area, followed by aspiration, may yield fluid which shows lepra bacilli.

A vaccine prepared from local strains of organisms is on trial with regard to the pneumonia so prevalent on the gold mines. Tubercle bacilli were found in 15.5 per cent. of the 27,962 specimens of sputum submitted for examination. Four cases of undulant fever were diagnosed by laboratory tests, as also one of blood infection with *B. fæcalis alkaligenes*. Differential leucocyte counts were carried out on 526 children belonging to the "poor white" class. A considerable number showed eosinophilia (? helminthiasis), 46 showed malaria parasites, and 14 per cent. a marked increase in the large hyaline mononuclear count; these results would appear to indicate latent or mild ankylostomiasis and malaria as important factors in lowering the health of this population.

Reports of the activities of the biochemical, vaccine, and serum departments follow. The anti-typhoid serum has been raised in potency. Calmette's "B. C. G." is being widely used, and "several hundred natives" who had undergone the tuberculin test previously were inoculated by this method.

Sir Spencer Lister, as Director, is to be congratulated on another year's annual report of very considerable interest.

KASHMIR C. M. S. MISSION. ANNUAL REPORT FOR 1930. By DR. E. F. NEVE, M.D., C.M., F.R.C.S. (EDIN.). MYSORE: WESLEYAN MISSION PRESS. 1931.

THIS always interesting annual report continues to record a story of progress, and, as usual, is illustrated by most interesting photographs. In recording his appreciation of the work done by this hospital, Major-General Nickerson, V.C., C.M.G., Director of Medical Services, India, who visited the hospital during 1930, writes "It has given me the greatest pleasure to have seen at first hand what this institution does for the people of Kashmir..... The best of all methods of winning the confidence and respect of races, other than our own, is by the establishment and efficient running a good hospital. One has only to see the full wards and crowded out-patient department in this hospital and to observe the attitude of the patients towards the medical and nursing staff, to realise that the above-mentioned ideal has been attained. I have nothing but good to say of everything one saw."

The total number of in-patients during the year was 2,165, and of out-patients 47,921; in addition to this three district tours were undertaken throughout the Kashmir Valley, during which 5,752 new patients were seen. It is mentioned that the Kashmir Government hope soon to construct a tuberculosis sanatorium, and to increase the number of village dispensaries. A comment is made on the differences between the diseases of England and those of Kashmir; in the former a multiplication of trades and occupations leads to a very great variety of disorders; in Kashmir the number of diseases is less, but parasitic diseases abound, more people are affected, and epidemics of cholera and small-pox stalk through the land. Of 1,115 major operations performed, those on tumours (including tuberculous glands) headed the list—430 operations. The eye work is very important—265 major operations; of a total in all of 1,484 eye operations 379 were for entropion and trichiasis. Pterygium is very common, and about 10 per cent. of the eye operations are for senile cataract. Bone disease also looms large on the surgical side—osteomyelitis, tuberculosis and syphilis all providing their quota.

On the medical side, in district work the importance of Ascaris infections is stressed, almost the whole child community being infected. Diseases of the alimentary canal come next, but respiratory affections are much less prominent than they would be in a return for an urban area. Pulmonary tuberculosis has begun to make its appearance in the villages, however. About one per cent. of the patients had goitre, which is endemic in some districts. Dr. Neve notes that pulmonary tuberculosis is definitely on the up grade in Kashmir.

The total income during the year was Rs. 68,221, and the expenditure Rs. 59,840. The State grant in aid is only Rs. 10,833, and the hospital is almost entirely financed by voluntary contributions, fees, and interest on invested funds. The need for subscriptions and donations is very great.

A great loss was sustained during the year by the death of Sister Lucy McCormick, who had for many years rendered invaluable service as nursing superintendent.

SIXTY-EIGHTH ANNUAL REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL, FOR THE YEAR 1929-30. CALCUTTA: BENGAL SECRETARIAT BOOK DEPOT. 1930. PRICE, 9 ANNAS.

MR. C. C. CALDER'S annual reports are always of interest, as they contain a full presentation of the quinine position and general policy. The following are abstracts from this report:—

General.—Although the interests of public health, in so far as these are dependent on quinine supplies and their distribution, cannot be shown to have been advanced far during the year, and although the correlation of supply and demand in this market presents its old time difficulties, the year has been a very favourable one indeed for the Cinchona Department. A season exceptionally well suited to the growth of established cinchona with a bumper bark harvest and steady progress in the factory is reflected in accounts which are at once a vindication of past policy and a pointer to what may be expected from its continuance in the fields of cinchona and quinine production.

But we have been working under favoured conditions, and to the year's success sound plantation management and fortunate climatic conditions have not alone contributed.

Quinine holds a position unique in a world of surplus commodities. For a series of years the price of the drug has remained unaffected by all those factors which have been operating in other fields. In 1926 Rs. 18 was fixed by the Kina Bureau as the price at which its product should be released, and the power of those who guide supply in this commodity may be gauged from the fact that fluctuations in price have reflected little more than differences in exchange values during the intervening period. When it is realised that over-production in quinine is as marked as it is where some of the world's staple commodities are concerned, the question may well be asked how quinine escapes effects so evident elsewhere. The answer is that while it is being produced in quantity in excess of the world's demand, stocks are still well below real world requirements as measured by health standards, and both price and production remain under a control which, called for and welcomed by the industry itself, is now loyally supported as in its best interest and as the only means of maintaining its steady economic development.

We are here, therefore, dealing with production under control. In other cases of overproduction the absence of control does not require in these times to have its effects demonstrated. We see them in the rates for tea, rubber and tin, to mention three important Eastern products only, falling to a point that makes the less well managed concerns go to the wall. Prices, indeed, in some cases have reached a point beyond which the

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industries continue only in the hope of better times and because of the disorganization and difficulty of reorganization that would follow a disruption of labour forces.

That it is otherwise in the cinchona and quinine industries has been to the benefit of all concerned in these difficult trade times, and if the Cinchona Department can with others regret the restricted use of its product it can yet rejoice in the guidance the industry has and congratulate itself in escaping the depression so evident elsewhere. For here both price and production are steady, the former because, in spite of much that is said to the contrary, it is not greatly in excess of costs, the latter because the product remains unaffected by long storage and the industry can afford to await a time when effective yearly demand will more nearly balance, if not exceed, yearly harvests.

The reasons for such strength in this industry are interesting. Political causes have determined that in the areas of South America where the plants are native, labour cannot be organised to develop and maintain a cinchona industry thriving as it would thrive nowhere else, and outside its native limits the plant takes unkindly to generally prevailing climatic and soil conditions. They are chance coincidences that the one area of the world outside America most suitable for this cultivation should be limited to two large islands in the Malayan Archipelago, that both these islands should be governed by a single power and that this power should be that which, above all other European, has shown powers of co-operation in production and marketing and an ability equal to the best in matters of the scientific organization and development of land industries. With these considerations for backing the result does not surprise and we find an industry standing up against world economic disruption as no other industry is standing.

The steadiness of price might indicate monopolistic influence; indeed it is to this that it is usually ascribed, and yet the only monopoly the Dutch have has been determined for them by the fact that quinine—the cinchona alkaloid easiest of production in their possessions—is also the one most favoured as a febrifuge by the medical world. Were it otherwise the history of the campaign against malaria might read very differently to what it does. The favour that quinine enjoys above others may rest on well found clinical experience, but it is not the only alkaloid nor is it the only useful one and strict adherence to it has directed the effort against malaria in a way that is, perhaps, too little understood. Quinine is, and, till South America is more settled politically, must always remain a Dutch Eastern product. No other known part of the world can compete with Java. Its climatic and soil conditions give it advantages unknown elsewhere so far as the particular alkaloid quinine is concerned. But the preference shown for quinine has determined more than has anything else the limitation of areas suitable for development as febrifuge yielding centres, and it more than any other is the real cause of such monopoly as the Dutch now exercise in this field of production. It is a monopoly that nature forces on Java by reason of medical preference. The rigid adherence to quinine connotes the maintenance of a monopoly in the true sense of this word. It means the continued development of a cinchona industry directed towards quinine, when an industry having as its aim a balanced production in greater mass of all the useful alkaloids might have more far reaching effects in the world control of malaria. We cannot get away from the fact that quinine is the rich man's remedy while malaria is the poor man's heritage, but let medicine once admit and practise the value of the other alkaloids and many Indian areas might then be turning out febrifuges at costs more suited to the poor. For with a change in medical opinion and practice we could make use of kinds of cinchona that do not demand Java soil and climatic conditions for their best development, and the truth will have been recognised that the elimination of malaria means first its control in that section of the population which has scarcely heard of quinine and which cannot afford to buy it even at cost price. If the year's accounts show that the problems of production are being tackled with success this is the better reason why the present difficult problems of consumption should not be brushed aside. They are great but on their solution depends further advance, and so long as they are not solved must the success attained in production miss its mark.

Extensions, acreages and crops. (*a*) *Mungpoo.*—An extension of 130 acres for which 205,870 young plants were reared enabled the plantation to balance the acreage cut out and retain a fully stocked area of 1,049 acres. The new blocks were made up of 59 acres Ledger on Mungpoo, 22 acres Ledger on Labdah, 17 acres Succirubra on Mungpoo and 32 acres Hybrid II on Labdah. Excellent weather conditions prevailed at the time of planting and the land selected was in good fettle after a twenty years' rest in young forest. These blocks are confidently expected to do well.

(*b*) *Munsong.*—The continued prevalence of the nursery epidemic overshadows all other plantation considerations for the moment. Further experiments in the disinfection of nursery soils and sites have not pointed to any easy specific for the disease, but it was premature to say that a plant once attacked was doomed in the struggle against it. This is not borne out by subsequent experience and the attempts made by mildly attacked plants to throw off the disease once in the open is perhaps the most promising indication of how the trouble may be countered. Very early planting to permanent situations in the field before the condition becomes epidemic in the nursery, may prove at once the prevention and cure of the disease and give the solution to a problem that is of immense importance to cinchona in the whole district.

The effect of various degrees of nursery shade is being tested and, with the idea that the times of sowing may affect the virulence of the attack, experiments in this direction are being carried out.

The outstanding facts of the year are that the disease persists and that a good measure of success has been attained in spite of it. Its presence on Mungpoo has also been established but here it is not epidemic and does not show up till after the plants have passed the nursery stage.

Extensions, by which is meant the area of young plants put out irrespective of whether they go on new or old cinchona land, comprised 56.5 acres Ledger only, 40.5 acres on Kashyem and 16 on Munsong division. This is a meagre extension but the factors conditioning it are well known to Government.

Factory work.—Besides, 28,127 lbs. Java and 21,080 lbs. Burma bark for the Government of India, 485,298 lbs. Mungpoo (450,536 lbs. Ledger, 12,818 Succirubra, 21,944 Hybrid) and 575,358 lbs. Munsong barks (499,922 lbs. Ledger, 7,188 lbs. Officinalis, 9,691 lbs. Succirubra and 58,557 lbs. Hybrid) were worked up to produce 29,050 lbs. quinine sulphate powder (crude), 4,919 lbs. and 79,297 boxes tablets, containing combined, approximately 13,000 lbs. quinine sulphate, 726 lbs. other quinine salts, 15,681 lbs. cinchona febrifuge powder and 4,397 lbs. cinchona febrifuge powder converted to tablets.

The Java and Burma barks produced 2,090 lbs. quinine sulphate and 932 lbs. cinchona febrifuge powder.

The Mungpoo bark had an average quinine percentage of 4.22 and the Munsong 4.42.

Only 13,940 lbs. of the sulphate were fully purified and packed, the remainder being left half purified and stored in the large concrete bins. This expedient is rendered necessary by the large and steadily accumulating stocks and by the failure, so far, of all attempts to finance their use in the malaria campaign. No salts of other cinchona alkaloids were manufactured during the year but some 100 samples of local bark and 79 samples of Burma bark were analysed with a view to the selection of seed trees. The large areas going out in Burma, added to drains on the seed harvest following nursery disease, make the question of supply an important one.

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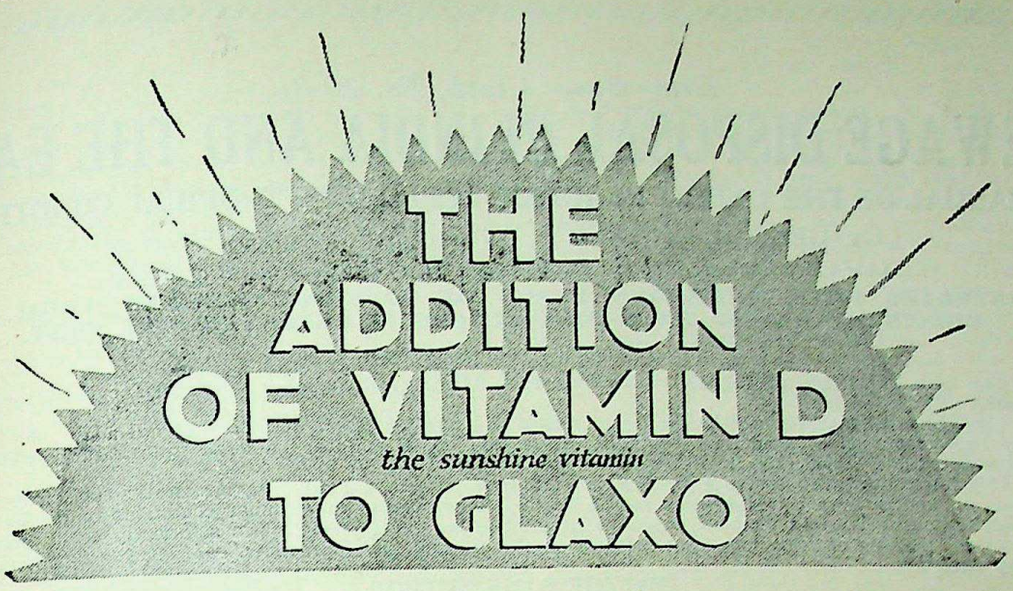

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(A) by adding to the milk the optimum amount of vitamin D.

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The milk used in the preparation of Glaxo is obtained from the healthiest herds of New Zealand cows, fed entirely on green pastures. Its purity, its fine, easily digested curd, and its formula, make it the food of choice when breast-feeding is either impossible or needs to be supplemented.

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WITH ADDED VITAMIN D

Builds Bonnie Babies

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PRACTICAL BAZAAR MEDICINES

with over 200 Practical Prescriptions.

By Lieut.-Colonel G. T. BIRDWOOD, I.M.S., M.D., M.A.,

Late Principal, Medical School, Agra.

PUBLISHERS' NOTE.

The Phenomenal success of this popular work has necessitated the issue of a second edition.

The object of the book is to put on record really simple and useful practical prescriptions of bazaar medicines and this character in the new edition has been maintained. A few new prescriptions have been added.

This handbook on Bazaar Medicines will be found exceedingly useful to medical men working in Indian districts, to those in medical charge of Branch District Dispensaries, Mission Dispensaries and those in private practice far away from chemist shops.

The list of bazaar medicines given according to their action shows what a large range of practical therapeutics bazaar medicines cover. If a medical man has a good knowledge of these, he can treat many minor maladies and relieve much suffering at a very little cost.

It must be remembered that a great many of the maladies of everyday life, for which doctors are consulted and for which people come as out-patients to dispensaries, are of a minor nature, as coughs, colds, indigestion, ulcers, sore eyes, sore throats, worms. Bazaar medicines intelligently used have a sufficiently practical and wide enough range to meet most of these maladies.

¶ There is no question that Bazaar medicines are much cheaper. A bottle of European medicine costs annas eight to Rs. 2, while a bazaar medicine costs a few pice. District Board Dispensaries can give a vast amount of medical relief at very little cost if bazaar medicines are intelligently and largely used. Even in such epidemics as influenza, plague, cholera and relapsing fever, bazaar drugs can give much relief.

Big manufacturing and pharmaceutical chemists are needed in India, who can make and standardize preparations and put them on the market.

It is interleaved with blank pages, so that practitioners can add useful prescriptions of their own to those already given.

THACKER, SPINK & CO., Medical Publishers, CALCUTTA.

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The work on tablets, which till a few years ago was done by juvenile jail labour, has been very successfully transferred to machinery at the factory and is running both smoothly and efficiently and at greatly reduced cost. A tendency to order quinine in tablet form is now noticeable and is likely to become more pronounced. Steps have been taken to substitute glass tubes for the cardboard cases now used and machinery has arrived from home for the manufacture of the necessary caps. The appearance of the make-up will be enhanced and in this respect the Government product will be brought into line with the more attractive trade brands of quinine.

Cost and value of quinine produced. (*a*) *Cost in the bark.*—Not counting a questionable amount of quinine passing through into the febrifuge, 29,050 lbs. crude quinine sulphate, about 13,000 lbs. sulphate in tablets and about 726 lbs. in other salts, a total of 42,776 lbs. were contained in 1,062,806 lbs. mixed Munsong and Mungpoo barks, costing at 3.6 and 2.7 annas a total of Rs. 2,06,768. The cost per lb. of quinine in the bark was, therefore, Rs. 4.83.

(*b*) *Cost of extraction, packing and delivery to railway.*—No advance on the figure of Rs. 2.721 for cost of extraction has been made. It has been used as a basis for charges to India and it is not proposed to change it pending the elaboration of commercial accounts.

(*c*) *Total cost per lb. and value.*—This is made up of the cost in the bark Rs. 4.83 and cost of extraction Rs. 2.721, a total of Rs. 7.55.

The wholesale rate being Rs. 18 per lb. the 42,776 lbs. quinine extracted in all forms as above defined are worth Rs. 7,69,968 but cost only Rs. 3,22,958.

Staff.—The writer held charge of his substantive post of Superintendent throughout the year.

At the factory Mr. G. E. Shaw was Quinologist and Dr. Monmohan Sen Assistant Quinologist until relieved by Mr. S. C. Sen, the substantive holder of the post, on return from study leave on the 17th February, 1930.

At Mungpoo Mr. P. V. Osborne was Manager. Mr. G. H. Fothergill, Assistant Manager, with Messrs Macey and Macdonald Overseers throughout the year.

At Munsong Mr. H. Thomas was Manager and Mr. P. W. Cresswell Assistant Manager till 17th November when he went on leave. Mr. G. Holl was Assistant Manager throughout the year.

Mr. Thomas has again had an anxious and trying year and is deserving of special mention for the efficient manner in which his duties have been performed. The marked improvement on Mungpoo reflects credit on all the executive officers of this plantation.

No mention of staff and their work would be complete without raising the general complaint of the senior executive officers that their time has to an increasing degree to be given to accountancy and office work. The requirements of modern audit, possibly, make this inevitable, but the increased efficiency in this direction that a transfer of power now dictates is expensively gained when it involves the diversion and misuse of technical ability. The Quinologist reports that little advance in the technique of manufacture was possible because his time and that of his assistant was employed on routine, office and accountancy work for which a chemist is not the most suitable person. The complaint will surely not fail to find an echo amongst other technical officers who work in the consciousness that a system is gradually undermining their real worth to Government.

Correspondence.

AN INDIAN JOURNAL OF TUBERCULOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The importance of tuberculosis as a disease is being recognised more and more in India. As one instance of this may be mentioned the fact that the Indian Thanksgiving Fund subscribed to celebrate the King-Emperor's recovery has been handed over to the Red Cross for carrying out anti-tuberculosis work. It is unfortunate that there should be no separate journal on tuberculosis in this country. In a small country like Great Britain there are two journals on tuberculosis, viz., *Tubercle* and the *British Journal of Tuberculosis.* The *Indian Medical Gazette,* which may well be compared with the *British Medical Journal* of England, is so hard-pressed for space that it is impossible for it to publish all the articles dealing with tuberculosis sent to it for publication. The necessity for a separate journal on tuberculosis is therefore obvious. To begin with the journal could be published quarterly. It will be interesting to know, through your esteemed columns, the view of others working on tuberculosis.—Yours, etc.,

Y. G. SHRIKHANDE, B.SC., M.B., B.S., T.D.D. (Wales).

KING EDWARD VII SANATORIUM,
BHOWALI, U. P.,
2nd March, 1931.

INSUSCEPTIBILITY TO VACCINATION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Have you or any of your numerous readers come across a case where without ever suffering from small-pox, one could not be successfully vaccinated? My eldest son is aged 23 years and during this period he was vaccinated more than a dozen times both here and at several other places including Calcutta, but never successfully. He has never suffered from small-pox, neither have we, his parents. My other children have all been successfully vaccinated excepting my youngest daughter aged 2½ years who seems to be like her brother in this respect. This child was vaccinated when 5 months old but it did not take; last year she was twice vaccinated with negative results.

Can anybody advise me what to do in such cases?—Yours, etc.,

N. K. MUKERJEE, L.M.F.

223, REKABGUNJ,
FYZABAD,
7th March, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

MAJOR-GENERAL J. W. D. MEGAW, C.I.E., has been nominated as a Member of the Council of State.

Lieutenant-Colonel F. E. Wilson, M.B., has been appointed to officiate as Inspector-General of Civil Hospitals, Central Provinces, with effect from the 7th February, 1931.

Lieutenant-Colonel H. E. Shortt has assumed charge of the duties of Director, Pasteur Institute of India, Kasauli.

Major C. M. Plumptre, to officiate as Civil Surgeon, Karachi, *vice* Lieutenant-Colonel I. D. Jones, proceeding on leave.

Lieutenant-Colonel M. J. Holgate, now officiating as Civil Surgeon, Belgaum, to officiate as Civil Surgeon and Superintendent, Medical School and Mental Hospital, Hyderabad (Sind), *vice* Lieutenant-Colonel J. L. Lunham, proceeding on leave pending retirement, and on his retirement, to hold the post substantively.

Lieutenant-Colonel E. H. V. Hodge, I.M.S., is appointed as Civil Surgeon, Hooghly, *vice* Lieutenant-Colonel C. A. Godson, I.M.S., on leave.

On return from leave Lieutenant-Colonel T. C. Boyd, I.M.S., is reappointed as Chemical Examiner to the Government of Bengal and Professor of Chemistry,

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Medical College, Calcutta, with effect from the 21st February, 1931.

Major A. C. Craighead has been appointed to officiate as Assistant Director, Central Research Institute, Kasauli.

Major J. B. Hance, O.B.E., has been posted as Chief Medical Officer in the Western India States Agency and Residency Surgeon, Rajkot, with effect from the 3rd February, 1931, *vice* Lieutenant-Colonel F. E. Wilson, M.B.

The services of Major A. S. Garewal have been placed at the disposal of the Government of the Central Provinces for employment in the Jail Department, with effect from the 25th February, 1931.

The services of Major A. Y. Dabholkar, M.C., M.B., have been placed permanently at the disposal of the Government of Bombay, from the 19th December, 1929.

The services of the undermentioned officers of the Indian Medical Service have been placed temporarily at the disposal of the local Governments specified against their names, with effect from the dates on which they assume charge of their civil duties:—

(1) Major M. M. Cruickshank, M.D., CH.M., Government of Madras.

(2) Major R. C. Phelps, M.B., Government of Burma.

(3) Major A. S. Fry, M.B., CH.B., F.R.C.S.E., Government of the Punjab.

(4) Major R. Lee, M.B., CH.B., Government of the Central Provinces.

Captain S. M. K. Mallick has been appointed as a Supernumerary Officer at the Central Research Institute, Kasauli.

Captain H. W. Mulligan, M.B., has been placed on foreign service under the Indian Research Fund Association, with effect from the date on which he assumes charge of his duties. He has been appointed substantively to the Medical Research Department from the 5th September, 1930, and as a Supernumerary Officer at the Central Research Institute, Kasauli, from the 12th February, 1931.

Lieutenant Manohar Keshav Pandit, has been appointed on probation from 17th August, 1930.

The undermentioned gentlemen holding temporary commissions have been appointed permanently to the Indian Medical Service as Lieutenants, subject to His Majesty's approval:—

Taqiud Deen Ahmad, M.B., 22nd April, 1930.

Mohammad Jafar, M.B., 5th August, 1930.

Fateh Mohammad Khan, M.B., 17th August, 1930.

Dev Datt, M.B., 17th August, 1930.

Madan Gopal Sainchar, M.B., F.R.C.S. (E.), 17th August, 1930.

Saiyed Wasiul Hasan Askari, M.B., 17th August, 1930.

LEAVE.

Colonel R. McCarrison, C.I.E., K.H.P., has been granted leave for 5th months and 21 days from the 10th March, 1931.

Lieutenant-Colonel D. D. Kamat, I.M.S., has been granted by the High Commissioner for India an extension of leave for 1 month on half average pay from the 28th April, 1931.

Lieutenant-Colonel I. D. Jones, Civil Surgeon, Karachi, is granted leave for 8 months, with effect from 27th March, 1931, or subsequent date of availing.

Major J. M. Shah has been granted by the High Commissioner for India extension of leave for 2 months from 3rd February, 1931.

Lieutenant-Colonel J. A. Sinton, V.C., O.B.E., Director, Malria Survey of India, Kasauli, has been granted combined leave for 12 months from the 1st April, 1931.

Lieutenant-Colonel C. A. Godson, I.M.S., Civil Surgeon, Hooghly, is granted leave on average pay for 8 months, with effect from the 23rd March, 1931, or any subsequent date from which he may avail of the leave.

PROMOTIONS.

The following officers have been promoted from the rank of Major to that of Lieutenant-Colonel, with effect from the 29th January, 1931:—

J. A. Sinton, V.C., O.B.E., M.B.
D. F. Murphy, M.C., M.B., F.R.C.S.E.
C. J. Stocker, M.C., M.D.
E. E. Doyle, C.I.E., D.S.O.
C. M. Plumptre, F.R.C.S.E.
L. F. Bradenbourg, M.B.
E. A. Penny, M.B.

The promotion of Brevet-Lieutenant-Colonel H. J. M. Cursetjee, D.S.O., M.B., to the rank of Major has been ante-dated to 27th July, 1923.

The promotion of Major N. C. Kapur to the rank of Major has been ante-dated to the 25th July, 1924.

Lieutenant C. F. J. Cropper has been promoted to the rank of Captain from the 8th February, 1931.

Lieutenant P. Shannon, M.B., has been promoted Captain (Provisional) from the 4th February, 1931.

RETIREMENTS.

Colonel C. C. Murison, F.R.C.S.(E.), has been permitted to retire from the 2nd January, 1931.

The King has approved of the retirement from the service of Lieutenant-Colonel E. Bisset, M.B., with effect from the 8th April, 1931.

Lieutenant-Colonel D. G. Rai, has been permitted to retire from the service from the 11th November, 1930.

Notes.

RADIOSTOLEUM, B. D. H.

ON ordinary diets the supply of vitamines A and D is apt to be defective, and "Radiostoleum" is claimed to be a preparation devised to supply this deficiency. The chief source of vitamine A in the dietary is from fatty foods, eggs, and green vegetables, and its chief function is to assist growth and protect from septic infections. Vitamine D is chiefly concerned with promoting calcium metabolism in both children and adults. In "Radiostoleum" both vitamines are tested and standardised by biological tests, the vitamine A content being also assessed by the antimony trichloride test of Carr and Price.

This interesting preparation is indicated to promote the growth of children, as an anti-infective agent in general, in respiratory tract infections, in hemeralopia and xerophthalmia, rheumatic infection, dental caries, puerperal septicæmia, in pregnancy, lactation, and at the menopause.

The preparation is a biologically standardised oily liquid, which can be taken in teaspoonful doses with meals or in milk. It can also be added to infant feeds. It is also put up in capsules, each containing the equivalent of 6 minims of "Radiostoleum," the dose being 1 to 3 capsules daily.

A recent brochure by the British Drug Houses deals fully with this new preparation.

CAPROKOL, B. D. H.

"CAPROKOL," it is claimed, is hexylresorcinol in olive oil, and is a urinary antiseptic and anodyne. Administered orally, it is claimed to be chemically stable, of a high bactericidal power, non-toxic, unaffected by organic matter, non-irritant, and free from odour. Its administration is indicated in such conditions as cystitis, pyelitis, prostatis, urethritis, as a preliminary to

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Vigantol

the standardized vitamin-D preparation

aborts rickets,

facilitates healing of bone-diseases, e.g., brittleness, tuberculosis of the bone, and fractures,

promotes bone-growth and muscle-development,

prevents disturbances in teeth-formation and favourably influences the breaking through of teeth and the growth of a firm enamel,

raises the defensive powers of the organism of infants and young children against diseases,

protects the mother during pregnancy and the nursing period from deficiency of calcium as evidenced by deterioration of the teeth, and pain in the joints, bones, and muscles,

increases the appetite and general metabolism.

ORIGINAL-PACKINGS:

Vigantol' Oil: Bottles of 10 c.c. and 50 c.c.
(1 c.c. contains 50 clinical units).

Vigantol' Pellets: Bottles of 50;
(1 Pellet contains 10 clinical units).

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EPHETONIN

E. MERCK
DARMSTADT

Ephetonin replaces adrenalin in the treatment of *Bronchial Asthma, Hay-fever, Hypotonia, Urticaria* and other allergic conditions; it also completely supersedes adrenalin by reason of its *oral* administration.

EPHEDRALIN

Ephetonin 0.03 gm.,
Paranephrin (adrenalin) 0.0003 gm.

A compound which combines the immediate action of adrenalin with the prolonged effect of Ephetonin.

It is specially indicated for hypodermic administration in severe cases of asthma, and in collapse during anæsthesia and operation.

A recent addition!

EPHETONIN PEARLS

Facilitates the administration of Ephetonin in small doses, hence its use in pædiatrics and as a prophylactic.

Supplied as follows:

Ephetonin Powder, in bottles of ½ oz.
Ephetonin Ampoules, gr. ½ in 1 c.c. in boxes of 6 ampoules.
Ephetonin Tablets, of gr. ½, in bottles of 25.
Ephetonin Pearls in bottles of 50.
Ephedralin Ampoules, in boxes of 6.

Agents in India:—

MESSRS. MARTIN & HARRIS, LTD.,

Rowlette Building,
17, Prinsep Street,
CALCUTTA

119, Parsi Bazar Street,
Fort,
BOMBAY

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operations on the urinary tract, and in post-operative treatment after such operations. Case reports record its successful administration in infections with the *Bacillus coli*, staphylococci, streptococci, and gonococci. The preparation is put up in two forms, in capsules for adults, each containing 0.15 grm. of Caprokol in olive oil, the dose being 2 to 3 capsules thrice daily; and in a 2½ per cent. solution in olive oil for children.

"COLLOSOL" TRANSFUSION AMPOULE.

THE Crookes Laboratories, P. O. Box No. 500, Bombay, have recently placed on the Indian market the "Collosol" Transfusion Ampoule which is a very useful piece of apparatus for the emergency administration of various solutions intravenously. The series of solutions already in use include standardised aseptic solutions of gum saline, hypertonic saline, normal saline and normal glucose. The ampoule with its holder is immersed in a bath or pail of water at 140°F. for exactly two minutes which raises the contents of the ampoule to 100°F. ensuring that the fluid passes to the cannula at normal body heat. Immediately after removal from the heating bath the metal holder is laid horizontally and the constricted part of the lower tube is broken off—the fluid will not escape—and the cannula tube is connected. A control clip is then fixed on the rubber tube and the apparatus is hung up vertically. The air filter is connected to the upper tube by a rubber sleeve, and the free end of the air filter broken off, so that air is admitted and the fluid flows down to the cannula ready for injection. The operator should see that all air is ejected from the cannula tube. This ingenious apparatus is easily transported and manipulated, and the contained solution is secure from contamination.

Further details may be obtained from the Crooks Laboratories, P. O. Box 500, 10, Graham Road, Ballard Estate, Bombay.

SERVICE SUGGESTIONS.

A TRADE journal which will interest radiologists is *Service Suggestions*, published by the General Electric X-ray Corporation, 2012, Jackson Boulevard, Chicago. A recent number received deals with the Coolidge "Double Focus" *x*-ray tube; technical factors in radiography of the stomach and colon—an article full of practical points; the occlusal view in dental radiography; the operative technique for zinc ionisation of the middle ear; new "Victor" *x*-ray tables; sinus radiographs; and the use of the diathermy current in eye diseases. The articles are all well written and instructive, and radiologists would do well to write for copies. The last article in the number especially stresses the value of diathermy in relieving pain in all ocular diseases, and especially in acute glaucoma.

DIMOL.

A RECENT brochure by the Anslie Walker Laboratories, 34, Ludgate Hill, London, E. C. 4, deals with the oral administration of Dimol in late pregnancy with a view to the avoidance of puerperal toxæmia. Examination of the urine of 12 patients four to eight weeks before term showed that in several considerable amounts or even excess of indican, skatol, and tyramine were present. The treatment given was the oral administration of three 1-grain tablets of Dimol immediately before or after each meal for a period of 3 to 9 weeks. The result claimed is that all traces of indican, skatol and tyramine were eliminated, except in three patients in whom traces only of these substances were still present. The claim is made that by the administration of this drug during late pregnancy intestinal toxæmia may be reduced and puerperal morbidity and mortality lessened.

ARNOLD'S STOP WATCHES.

THE doctor always requires a watch with a reliable second hand in order to count the pulse. In this connection the stop watches manufactured by Messrs. A. Arnold & Co., 17, Elmcroft Avenue, Golders' Green, London N. W. 11, are of interest, since the firm is one whose watches are reliable and reasonable in cost. In a recent issue of *Engineering, Industry and Commerce* attention is drawn to four models of stop watches manufactured by this firm. The most interesting of these is the "Sportsman" stop watch which reads to one-fifth of a second. Without a fly-back motion it is sold at 7*s*. 6*d*.; but fitted with a fly-back arrangement at 25*s*. A second model, the "Laboratory fly-back" is especially intended for timing rapid procedures in laboratories; this gives extremely accurate timings down to fifths of a second, has a 15-jewel lever movement, and would obviously be useful in photography and in laboratory use. The cost of this is 70*s*. but a five-year guarantee is given. A third pattern—the appointment alarm watch—at the price of 25*s*., and with the rear cover so made as to open backwards and form a stand—is intended for longer laboratory procedures; at one winding the watch is set for 30 hours, whilst the alarm can be set to go off after any given interval of time.

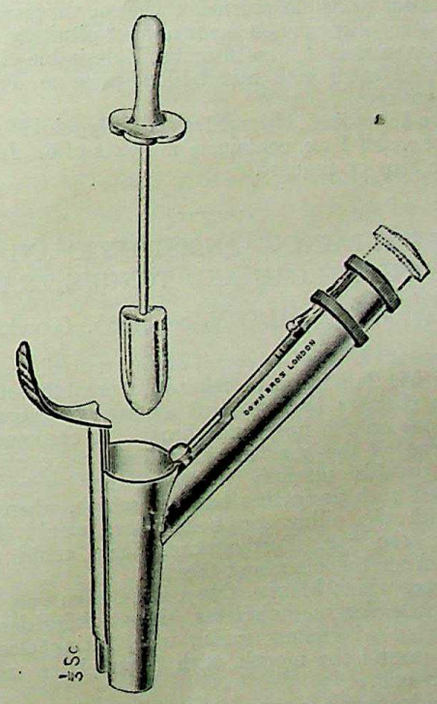
The watches issued by this firm may be of interest to medical men in general, and to laboratory workers in particular.

AN ILLUMINATED PROCTOSCOPE.

By P. G. McEVEDY, F.R.C.S.,

St. Peter's Square, Manchester.

THIS illuminated proctoscope has been designed specially to meet the requirements in the modern treatment of hæmorrhoids by injections.



The illumination is obtained by a standard pocket torch inserted into the handle. The torch can be withdrawn and the instrument sterilized. The handle, set at a convenient angle, allows the instrument to be manipulated with ease. The conical shape gives ample room for injections to be made whilst the mucous membrane remains under observation. As a rule injections are made with the slide in position. The instrument can then be rotated without re-inserting the obturator. The site of the injection can be accurately determined by withdrawing the lateral slide.

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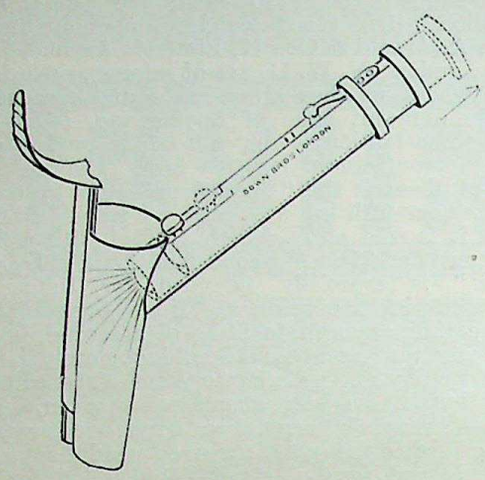
The instrument is equally useful in routine rectal examinations and in minor rectal surgery.



For use in operative work a similar instrument on a slightly larger scale is more useful.

This proctoscope has been made by Messrs. Down Bros., London.

"NEO-INFUNDIN" B. W. & CO.

MESSRS. BURROUGHS, WELLCOME & Co., Snow Hill Buildings, London, E.C., have recently issued a new product for obstetrical use entitled "Neo-Infundin." This substance is the oxytocic principle of pituitary posterior lobe almost free from the pressor principle.

"Neo-Infundin" has the same indications in labour as pituitary posterior lobe extract, but the absence of the pressor principle precludes the occurrence of the vasomotor phenomenon known as "pituitary shock" and also makes "Neo-Infundin" desirable in those obstetrical cases with raised blood-pressure (toxæmias of pregnancy).

"Neo-Infundin" is issued as a "Hypoloid" product in 0.5 c.c. and 1 c.c. containers in boxes of 6. Literature will be sent on request.

A SELF-RETAINING ANÆSTHETIC AND POST-ANÆSTHETIC GAG AND TONGUE TRACTOR.

By W. T. MILTON, M.D., M.S. (Lond.),

THIS gag is the outcome of a remark made by Mr. A. M. Zamora with regard to the advisability of sending patients back to bed efficiently gagged after operations on the nose and throat. It occurred to me that none of the gags in general use were of a type suited to this purpose in that they were mostly furnished with projecting handles, which, when in contact with the pillow or bedclothes, would tend to dislodge the gag. Furthermore, they could not be spared from the operating theatre.

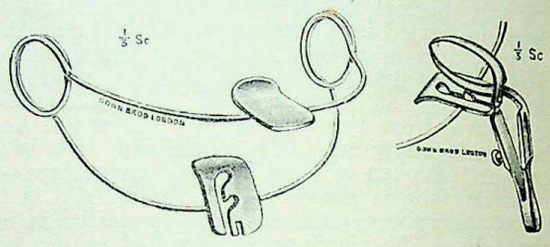
The gag which Messrs. Down Bros. have very successfully made for me obviates these difficulties. It is constructed of endless spring wire, fitting closely and snugly around the mouth, with finger plates and dental props in one.

The advantages claimed are:—

1. Ease and quickness of introduction and withdrawal with one hand.
2. The gag is self-retaining and is not easily dislodged.
3. The mouth aperture is sufficiently wide to permit of a generous airway, and to allow swabbing of blood and mucus, and not wide enough to cause any respiratory embarrassment.
4. There are no projections likely to catch on the bedclothes, inasmuch as the finger plates are central, and the lateral springs lie flat against the cheeks.

I have also found the gag very useful during the administration of anæsthetics in other than throat cases, particularly in those edentulous subjects whose flapping lips and cheeks so often hamper the anæsthetist. When used in this way the distance between the finger plates constitutes a helpful indicator as to the degree of muscular relaxation. With deep anæsthesia and fully relaxed musculature the finger plates are at their maximum distance apart, which distance gradually diminishes as the masseter muscles come into action once more with a lessening depth of anæsthesia.

Messrs. Down Bros. have also made for me a tongue tractor for use in conjunction with the gag. This, when anchored in the slot cut in one of the finger plates, is self-retaining. To obtain the maximum effect the tongue is secured in the clip and the latter drawn forward sufficiently to allow the narrowed neck of the clip to be slipped into the central slot. Lesser degrees



of traction can be secured by engaging the stud on the under surface of the body of the clip in either the central slot or one of the deeper ones.

I fancy that this gag may prove a useful addition to the midwifery bag for use in those very frequent cases where the practitioner has to rely on the services of the nurse or midwife for the maintenance of anæsthesia.

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Original Articles.

OPIUM AND ALBUMINURIA.

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[Drug Addiction Series No. 10.]

IT is a common belief among medical practitioners that patients suffering from kidney disease stand opium very badly. The basis for this belief appears to be that in books on pharmacology it has been stated that morphine is not as readily eliminated by the diseased kidney as by the normal kidney and, therefore, it should be given with the greatest caution in Bright's disease. What experimental basis there is for this belief is not quite clear. It has also been stated that instances have occurred where small doses of opium or morphine have proved fatal in such patients. Other pharmacologists have considered the use of opium or morphine inadvisable in nephritis where there is a uræmic tendency, not because it affects the kidneys directly, but because it lessens intestinal movements and allows greater absorption of toxins from the alimentary tract, thus throwing a greater amount of work on the kidneys indirectly. It is stated that although secretion of urine is uninfluenced by morphine, on account of the constipating effect it produces, it is inadvisable to use it. For these reasons, patients with chronic kidney disease suffering from irritable and distressing cough or agonising pains are often denied even temporary relief by this drug. Some practitioners go so far as not to give even preparations containing very small quantities of morphine, such as Grimault's syrup, in these conditions.

As we could not find any record in the literature of a systematic investigation bearing on these statements, we tried the effect of small and medium-sized doses of opium in a small series of cases suffering from affections of the kidneys in the Carmichael Hospital for Tropical Diseases. The cases selected by us were of varied nature. Some of them were suffering from chronic nephritis of the parenchymatous type, others had ascites, probably secondary to such conditions as dysentery, but they all had albumin in the urine indicating damage to the kidneys. The patients were kept strictly on a diet of known food-value and the amount of fluid administered was kept constant as far as possible. The daily output of urine and albumin were measured and carefully charted. Opium was given in gradually increasing doses in the form of a mixture, its taste and smell being effectively concealed so that the patients had no idea what they were taking. The initial dose was always one grain daily, gradually increased to 4 or 5 grains daily and in some cases to 8 to 9 grains daily. The patients were carefully watched as regards their general subjective and objective signs and symptoms.

We also wished to do periodical renal function tests on these patients but, as we could not induce them to remain in hospital for longer periods, this was not possible. Further work on these lines is in progress. A perusal of the following table will give all the information regarding these cases.

Discussion of results.

Effect on the urinary output.—A study of the table clearly brings out the fact that there was an appreciable *increase* in the quantity of urine in almost all the cases after administration of opium. In no case was the daily output of urine ever decreased below the average normal quantity.

Cases 4, 5, 7 and 8 were all severe cases of chronic nephritis and a perusal of the table will show that, contrary to the common belief, the quantity of urine in all these cases increased to an appreciable degree. This is probably not due to any effect of the opium alkaloids on the kidney secretion but to diminished peristalsis which increases the absorption of fluids from the gut.

Effect on albumin present in the urine.—It will be seen that the quantity of albumin in the urine of the majority of the patients showed a decrease. In some cases, e.g., case 4, the decrease was considerable. Albumin disappeared altogether from the urine in cases 2, 6 and 9 in which it had been present in traces before the administration of opium. In none of the cases was there any evidence of further damage to the kidneys in the shape of a persistent increase in the quantity of albumin or in the number of casts, etc. This is what one would expect, as, in man, 90 per cent. of a single dose of morphine may be recovered from the stools within three days and only traces, too small to estimate, are found in the urine.

Blood-sugar.—Administration of opium did not produce any definite effect on the blood-sugar. In most patients, the blood-sugar remained at the same level throughout the period during which opium was administered. Only in one case (case 3) was a decrease in blood-sugar seen, but as this was a very complicated case, it was difficult to say if the effect was due to opium.

Effect on the general condition of the patient.—The general condition of the patients, when

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TABLE.

Serial number.	Specification.	Physical signs and symptoms.	Quantity of urine passed in 24 hours.	Albumin percentage.	Daily dose of opium and total quantity given.	REMARKS.
Case 1	G. S. K., Mohammedan male, aged 18 years. Admitted to hospital on 25-9-28. Discharged on 16-10-28.	Headache, cramps, œdema of face and limbs.	....	On admission 0.3 per cent. which decreased to 0.2 per cent. Hyaline and granular casts present.	Started with 1 gr. daily, increased up to 5 grs. daily and then stopped suddenly. Total quantity given was 61 grs.	Opium gave rise to certain symptoms in this case, such as drowsiness, and nausea with vomiting at times. The pupils became *dilated* even with 5 grs. doses. The quantity of urine increased considerably.
Case 2	N. G. G., Hindu male, aged 48 years. Admitted on 1-2-28. Discharged on 21-2-28.	Irregular fever for long time, anæmia, spleen much enlarged.	Quantity passed was about 360 c.c. which definitely increased. At one time it went up to 1,440 c.c.	Never more than a trace; became *nil* at the end of the treatment.	Started with 1 gr. daily, increased to 4 grs. and decreased again before stopping. Total dose given was 43 grs.	Neither improvement nor any untoward effects were noticed. The patient felt a general sense of well-being. Appetite improved.
Case 3	W., Anglo-Indian male, aged 55 years. Admitted on 25-2-28. Discharged on 12-3-28.	Breathlessness, cough, flatulence, constipation, heart dilated, cyanosed face, anæmia, chronic bronchitis, epigastric pulsation, heart irregular. Diagnosis—Nephritis with dilated heart.	Passed considerable quantities of urine.	Distinct traces remained throughout.	Started with 1 gr. daily, increased to 3 grs. Total dose given was 34 grs.	Patient's symptoms were considerably relieved though the physical signs remained unaltered. He felt much more comfortable and had better nights.
Case 4	N. B. C., Hindu male, aged 27 years. Admitted on 26-1-28. Discharged on 20-2-28.	Œdema of legs, urine scanty, high coloured; rise of temperature. Diagnosis—Nephritis.	810 c.c. in the beginning which gradually increased up to an average of 1,500 c.c. The maximum one day was 2,500 c.c.	1.3 per cent. The total excretion per day in the beginning was over 8 grammes which came down to the lowest of 0.18 per cent. (total 3 grammes); on one occasion it could only be detected in traces.	Started with 1 gr. daily, increased to 3 grs. gradually cut down to nothing. Total dose given was 55 grs.	The patient felt much better. The swelling became very much less; the most noticeable feature was the decrease in the quantity of albumin and the increase in the quantity of urine. Appetite was markedly improved.
Case 5	S. A., Mohammedan male. Admitted on 12-3-28. Discharged on 21-3-28.	Œdema of face, hands and feet, scanty urine, chronic dysentery. Liver enlarged. Diagnosis—Nephritis.	300 c.c. in the beginning, increased up to 900 c.c. during treatment but came down to about 360 c.c. towards the end of the treatment.	1 per cent. in the beginning and remained so, more or less throughout the course of treatment.	Started with 1 gr. daily, increased to 3 grs. Total amount taken—16 grs.	The general condition of the patient improved only slightly—there were no untoward effects. The œdema did not decrease to any appreciable degree.
Case 6	B. D., Hindu male, aged 22 years. Admitted on 3-1-28. Discharged on 18-2-28.	Œdema of face and feet, ascites, liver and spleen much enlarged. Ascites tapped twice. Chronic dysentery. Diagnosis — Nephritis with ascites.	420 c.c., increased spasmodically once up to 1,200 c.c. but was about 500 c.c. daily towards the end.	Albumin present in traces in the beginning, gradually decreased to a faint trace and then disappeared altogether.	Started with 1 gr. daily, increased to 3 grs. daily. Total dose given was 29 grs.	The general condition of the patient improved, œdema appreciably decreased.

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TABLE—*concld.*

Serial number.	Specification.	Physical signs and symptoms.	Quantity of urine passed in 24 hours.	Albumin percentage.	Daily dose of opium and total quantity given.	REMARKS.
Case 7	B. C. B., Hindu male, aged 52 years. Admitted to hospital on 10-3-28. Discharged on 27-3-28.	Generalized œdema, starting first at face and feet.	840 c.c. in the beginning, maximum 1,200 c.c. and remained over 1,000 c.c. daily on an average.	0.8 per cent. in the beginning, fluctuated a good deal, came down to about 0.5 per cent. towards the end.	Started with 1 gr. daily, increased up to 4 grs. daily. Total dose given was 45 grs.	The improvement in the patient's condition was not marked though no untoward effects were produced.
Case 8	M., Hindu male, aged 46 years. Admitted to hospital on 18-4-28. Discharged on 7-5-28.	Œdema generalized, ascites marked. Diagnosis—Nephritis.	Passed over 1,000 c.c. throughout—no appreciable change noticed.	0.85 per cent. to 0.9 per cent. in the beginning, remained more or less about the same level throughout.	Started with 1 gr. daily, maximum dose given was 3 grs. daily. Total dose given—33 grs.	Not much change was noticed in the patient's condition during the course of treatment.
Case 9	K., Hindu male, aged 32 years. Admitted to hospital on 25-9-28. Discharged on 9-10-28.	Cataract both eyes.	....	Faint traces only, with hyaline casts—disappeared within 10 days—casts were also not seen.	Started with 1 gr. daily, maximum 3 grs. daily. Total dose given was 23 grs. Started again from 23-10-28 with 2 grs. daily, maximum daily dose this time being increased to 9 grs. daily.	The general condition of the patient improved. Albumin and casts disappeared from the urine.
Case 10	B. P., Hindu male, aged 30 years. Admitted to hospital on 1-2-28. Discharged on 22-2-28.	Albuminuria, with high blood-pressure, 172/150; heart dilated.	Definitely increased from 720 c.c. to maximum of 1,800 c.c.—average towards the end about 1,000 c.c.	Traces, and remained so throughout the course.	Total dose given was 55 grs.	The patient felt more comfortable. The quantity of urine increased.
Case 11	J., Hindu male, aged 27 years. Admitted to hospital on 26-1-29.	Œdema of face, scrotum and legs; indigestion, anorexia, diarrhœa.	Profuse, about 4,800 c.c. daily; remained about the same level throughout.	0.02 per cent. in the beginning; went down to a trace.	Started with 1 gr. daily, increased to 6 grs. daily. Total dose—82 grs.	General condition improved. Œdema decreased.
Case 12	C. L., Hindu male, aged 27 years. Admitted to hospital on 25-2-29. Discharged on 29-4-29.	Œdema both legs; dysentery, 2½ months irregular fever.	Quantity of urine fluctuated between 2,280 c.c. and 1,200 c.c.	0.15 per cent. on the first day—fluctuated to some extent during the period of administration of opium but settled down to the same level at the end.	Started with 2 grs. daily, maximum 8 grs. daily. Total dose given was 128 grs.	This patient had 128 grs. of opium in 25 days; but in spite of these fairly big doses the nephritic condition did not appear to grow worse.

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put on opium, decidedly improved in the majority of the cases. This was especially so in cases 3, 4 and 6, who were very disappointed when the drug was discontinued.

Case 1 became slightly drowsy and had nausea and vomiting also. The pupils of this patient became dilated when fairly large doses of opium were being given, so that it would appear that the effects were not produced by opium direct but were probably due to increased absorption of toxins from the gastro-intestinal tract.

Case 9 also had some of these symptoms but, as he developed bronchitis, the drug was discontinued. About a fortnight later when the lungs became clear, he was put on larger doses of the drug, but no unusual symptoms were noticed. On the other hand, the patient's general condition improved and he felt very hungry.

Summary and conclusions.

Opium in doses ranging from 1 to 9 grains daily was administered in a series of 12 cases of albuminuria due to various causes. In the majority of cases, the output of urine definitely increased. The quantity of albumin generally showed an appreciable decrease and in none of the cases was there any indication of added damage to the kidneys, evidenced by a persistent rise in the quantity of albumin or an increase in the number of casts, etc. The general condition of the patients improved in all cases and they felt much more comfortable. A study of these cases showed that, if care is taken to keep the bowels working well, opium can be administered in fairly large doses to patients suffering from albuminuria.

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THE RELATION OF ACETONÆMIA TO JUVENILE ILL-HEALTH IN INDIA.

By E. H. VERE HODGE,
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THE subject of acetonæmia, or, as it is somewhat loosely termed, acidosis, in children, has occupied much attention of late years. Dr. Still has done much to familiarise the practitioner with the subject of cyclical vomiting, and Frew and others have shown that acetone in the urine is by no means confined to this condition.

Before proceeding to discuss the reasons for the prevalence of acetonæmia in India, it may be well to consider briefly the causes of the appearance of these short-combustion fat products in the blood and urine. The complete combustion of fat depends on the supply of sugar in adequate proportion in the diet, the sugar-fat ratio apparently altering in the direction of increase in sugar as the child grows older. Failure to maintain this ratio results in arrested fat combustion with the production of ketone bodies.

This explanation is simple, but unfortunately by no means accounts for all acetonæmic conditions. It is, however, a practical working hypothesis; in the ensuing paper the writer attempts to show that it is the failure to appreciate that there is a marked alteration in the correct fat-carbohydrate ratio in the tropics, which leads to the prevalence of acetonæmia in India.

The causes of acetonæmia are multiple, in many cases more than one factor is at work, but they may be divided into certain groups:—

1. Primary. Due to digestive disturbance including disorder of the liver function. There is a general tendency in the tropics, especially amongst Europeans, to adhere to standards of diet laid down for temperate climates. The conviction is growing on the writer daily that for hot climates the correct ratio of fat to carbohydrate in infant feeding is not 1 to 2 as in temperate climates, but nearer 1 to 4, and that the correct percentage in milk mixtures is fats 1.5–2 to carbohydrate 7–9.

Again, in the case of breast-fed children, the writer has found that the fat-percentage is frequently too high and results in early dyspepsia. Thus is the train laid for fat intolerance, which is a condition not only of alimentary dyspepsia, but of an inability to complete fat combustion even in the presence of an adequate carbohydrate ratio. Such a condition once established is persistent, and it is probable that in many of the subjects of recurrent bilious attacks, cyclical vomiting and associated disorders, the seeds of the disease are laid in very early life. That fat intolerance is easily, almost automatically, acquired was impressed on the writer in comparing the digestive capacity for fats of infants born in the hills with those who have spent some months in the plains. The former will accept an almost English scale of diet, while the latter must be introduced to this standard gradually and cautiously.

In older children other factors are at work; abrupt alterations of temperature, chills, etc., lead to disordered action of the liver, whilst

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in the common condition of carbohydrate dyspepsia, an associated pancreatic deficiency may be presumed.

Quite distinct from the above are the children of the second type, the sugar-shortage children. In these children there is no evidence of dyspepsia apart from vomiting, which is due rather to emotional crises, or is associated with the later stages of an attack of acetonæmia. They are of a well-defined type, usually attractive, active mentally and physically above the average, well formed but thin and slow in putting on weight; they are easily excitable. It is to be supposed that there is excessive adrenal output and clinically there is often a suggestion of adrenal exhaustion. Such children are prone to vomiting in moments of emotion or in the state of exhaustion to which they are liable, and the vomiting may set up the vicious circle of an attack clinically identical with cyclical vomiting. An example may be offered in a girl of 9 who had suffered from periodic attacks with severe vomiting, fever and prostration, from the age of 17 months. Under treatment she remained clear for 18 months, but the distress caused by the loss of a favourite doll broke down the defences and a typical and severe attack ensued. A common type is seen in railway acidosis. The writer has seen a number of children who arrived at the end of each migration to the hills or plains in a state of collapse, with fever, rapid pulse, lethargy and persistent vomiting, in one case sufficiently violent to cause a marked hæmatemesis. These children were enabled to perform their journey in complete safety by subsisting on a fat-free diet with high carbohydrate content for two days before and during the journey.

The family history often reveals a strong asthmatic or migraine inheritance.

The contention that cases in the second category are due to sugar-shortage is supported by the following facts: (*a*) estimation of the blood-sugar content in children shows that it is markedly reduced by vomiting (Brown, 1925). (*b*) The symptoms are those of hypoglycæmia, particularly the rapid pulse and collapse. (*c*) The effect of the administration of large doses of glucose, not only in the immediate relief of an acute attack, but also in the certain improvement of the health of the child showing minor evidences of the condition.

Briefly then, there are two types of primary acetonæmia, the first due to faulty fat metabolism independent of the carbohydrate ratio, and the second due to sugar-shortage.

The third type of acetonæmia is secondary and is of importance under three considerations: (*a*) That by its presence the symptoms and discomfort of the primary disease are intensified. (*b*) That, in the presence of a primary cause, acetonæmia may be avoided by adjusting the diet to the requirements of the patient and the disease. (*c*) That many cases of cyclical vomiting are traceable to a definite cause, placing the condition in the category of a secondary acetonæmia; (e.g., girl, aged 7, two attacks culminating in deep coma within six months of each other; the child was found to be suffering from a markedly dilated stomach, in treatment of which the attacks did not recur). The main causes of secondary acetonæmia are:—

(*a*) Any condition leading to high fever and increased metabolism.

(*b*) Any condition, especially vomiting, which induces relative or absolute starvation.

(*c*) Sepsis, especially post-nasal.

Drs. Noah Morris and Stanley Graham (1927) have shown that there is a marked tolerance to injections of acetone into the blood of rabbits, but that beyond a certain point of concentration convulsions and coma occur, accompanied by an increased rate and depth of respiration, a definite reduction of the alkaline reserve in the blood and a lowered blood-sugar content. The effects of such injections are aborted by the injection of glucose or sodium bicarbonate solutions.

It is improbable that acetone concentration in human blood ever reaches the degree, 0.8 c.cms. per kilo, required to produce serious symptoms in rabbits, therefore it is preferable to describe the symptoms of an acetonæmic attack as being associated with, rather than caused by, the presence of acetone, especially as the symptoms are more attributable to lowered alkaline reserve or hypoglycæmia.

The symptoms of a major attack will consist of the following:—

1. Fever of varying degree; often as high as 104°F.

2. Rapid pulse rate with lowered tension, particularly marked in those cases due to sugar-shortage; for example, a child of 5½, of the typical sugar-shortage disposition and physique, had an abrupt rise of temperature to 103°F., pulse 180 per minute, counted with difficulty; after repeated doses of glucose the pulse rate was reduced to 120 in six hours and the imminent collapse averted.

3. Hyperpnœa ascribable to reduction of the alkali reserve; breathing sometimes deep and rapid, sometimes irregular, e.g., child aged 5, temperature 103°F., pulse rapid, respiration rapid and irregular, general condition suggests the onset of pneumonia; urine loaded with acetone. *Cause*—Drinking two pints or more of rich-cream dairy milk daily during the hot weather.

4. Lethargy is a common symptom especially of the bilious primary type, occasionally amounting to coma. The writer has also seen convulsions associated with a high urine content of acetone.

5. Vomiting is by no means a constant or essential symptom. When present, distinction should be made between vomiting as cause and as effect.

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6. Pain in the abdomen. A comparatively frequent feature—but how far such pain is an integral part of primary acetonæmia, or how far such pains associated with vomiting indicate a concealed cause, is a matter for further investigation.

7. Smell of acetone in the breath. This is sometimes noticed hours or even days before the attack. When this is so the case must be regarded as one of primary acetone poisoning, but in the majority of cases, the acetone is noticed only when other signs have been evident for some hours.

The attack usually lasts from two to five days, but acetone persists in the urine for some time after the symptoms have subsided.

Such are the symptoms which constitute a grave attack. Minor degrees are of course frequent, and are attributed by the laity to "biliousness." There are also minor symptoms of sugar-shortage, chief amongst which are a tendency to exaggeration of the pulse rate in excitement or fatigue; early inducement of exhaustion, and pains in the limbs often ascribed to rheumatism.

The treatment of the acute attack of acetonæmia or cyclical vomiting with glucose and sodium bicarbonate is now so familiar that it need not be discussed further, but the writer would suggest certain points, first, that the continuation of high doses of sodium bicarbonate between the attacks is to be deprecated; although it will avert the graver symptoms during the attack, it will not dispel the acetone; indeed, the acetone reaction may be obtained in urine of a high sodium bicarbonate content. Large doses act deterrently to the general recovery of tone. The writer prefers to use mixed salts after the first stage, acting on the assumption that there is general mineral depletion.

For the sugar-shortage type the addition of large quantities of sugar to the diet and the restriction of fats will be effective.

In the bilious type, calomel is invaluable, and mothers may learn to administer this during the premonitory stage and thus avert attacks. Where there is carbohydrate indigestion, taka-diastase is useful.

It is undesirable and often unnecessary to place children on fixed restricted diets. Progress should be checked by the frequent testing for acetone in the urine, and the fat content advanced within safe limits of tolerance.

In conclusion, the importance of a search for septic foci may be emphasised.

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INFANTILE BILIARY CIRRHOSIS AND ARTIFICIAL FEEDING OF INFANTS IN INDIA.*

By S. B. GOTHOSKAR, M.B., B.S.,
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THE subject of infantile biliary cirrhosis is of the greatest importance in medical practice in India, since many children all over India die every year from this disease; medical men believe that they are completely helpless in the matter, and try to console the parents by saying that no remedy for this disease has yet been found in the scientific world. My views on the subject are based on sixteen years of clinical experience, and on the fact that the treatment which I advocate has proved successful in my practice.

Let us first consider the European, or physiological, method of artificial feeding of infants. Human milk contains 1.5 per cent. of proteins, 3.5 per cent. of fat, and 6.5 per cent. of sugar. European cow's milk contains 3 per cent. of proteins, 3.5 per cent. of fat, and 4.5 per cent. of sugar. Ordinarily, the amount of proteins in European cow's milk is double that in mother's milk, the fat content is the same in both, and the sugar content a little less in cow's milk. Hence the European medical man advises that the cow's milk be diluted with an equal amount of water, and that the fat and sugar deficiency be made up, —usually by adding one teaspoonful of sugar and one of cream to every three ounces of prepared milk. This is the normal "humanized" milk of every standard European textbook.

Now let us consider the Indian method of artificial feeding of infants. There is one method—and one method only—in vogue all over India, and that is to give cow's milk after it has been deprived of all its cream. There is an extraordinary and universal—but disastrous—belief that fat in the form of cream is inimical to the child's health, and that giving milk with cream to a child causes infantile biliary cirrhosis. It is difficult to know how such an idea originated. The ancient Ayurvedic texts, such as those of Nighant and Ratnakar, ascribe a definite advantage to the retention of cream in the milk. It is only current Ayurvedic literature, which is not based on real Ayurved, but has incorporated information picked up here and there, such as the *Chikitsa Prabhakar*, that definitely advises removing the cream before infant feeding.

I have found this opinion held universally both in northern and southern India. After giving a lecture at a health welfare week, a Deputy Collector informed me that I was the first medical man whom he had ever heard advising retaining the cream. Another Deputy Collector whose child had died of the disease

* Being a paper read at a meeting of the Venguela Medical Society.

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told me that every medical man had advised removal of the cream. When giving lectures at Rajapur, Karwar, Baroda, Ratnagiri and other places, I have always found the audience amazed at the suggestion that the cream should be retained.

Unfortunately, a second universal popular belief is that giving buffalo's milk is apt to cause catarrh of the respiratory system; hence this valuable food-stuff is neglected. Indian cow's milk is given and is diluted with an equal volume of water. The cream is removed, and extra sugar is not added, owing to a still further popular belief that it induces round-worm infection. This combination of half and half milk and water is continued until the child is ten months old or more; it is not changed with the growth of the child. If there is constipation, the milk is still further diluted, under the impression that the milk is too concentrated and is causing the constipation.

Now the milk of the Indian Konkani cow does not contain the same proportion of fat as that of the English cow. This milk is very insipid, as those of you who have tasted it will verify. The fat is completely removed, no sugar is added, and the fat-free milk is diluted with an equal part of water. Such a product is not true milk at all, and bears no resemblance to "humanized" milk; one may term it "*aqua-milk*." The child gets a sufficiency of proteins from it, but there is a complete absence of cream, and the sugar is present only in greatly reduced amount. The child grows by degrees, but the "*aqua-milk*" remains as diluted as ever; constipation sets in, and because the child is constipated, the milk is diluted still further. The result is that at the age of eight months to one year the child is a thin emaciated creature, requiring a rectal injection of glycerine every day in order to open the bowels.

Such a picture is by no means exaggerated; it is the normal picture of the artificially fed Indian child. Sometimes a carbohydrate mixture, such as *nachnyachi pithi*, is given without the addition of sugar. Following on the emaciation and constipation, there sets in enlargement of the liver and spleen. The enlargement of the liver is noticed early, owing to the protuberance of the abdomen; that of the spleen only becomes evident later. The child is now brought to the medical man, who prescribes a liver mixture, and such drugs as calomel or castor oil for the constipation. He does not consider the possible factors in ætiology, but diagnoses the condition as infantile biliary cirrhosis, and tells the parents that the case is well-nigh hopeless. I make bold to say that the vast majority of Indian children fed from birth on cow's milk in this way, without getting any mother's milk, meet with this fate.

If the child has been fed on mother's milk for some time, and then is fed on cow's milk as above, or if combined feeding by both methods is resorted to, infantile biliary cirrhosis does not occur, but symptoms of rickets set in, such as laryngismus stridulus, rickety paresis of the legs, or a rickety spine.

In my opinion the essential cause of infantile biliary cirrhosis is starvation of the infant,—especially starvation in fats and sugar; the liver at first hypertrophies as its functions are not fully exerted, then atrophies.

Medical students in hospitals in India are not taught anything about the diseases of infants and children. Consequently they know nothing about the artificial feeding of infants when they enter into practice. Again and again in all parts of India I have met with medical men whose advice to parents was to remove all cream from the milk before giving it to infants. This most pernicious but popular belief, common to the lay public and to Indian medical practitioners alike, is responsible for a great deal of infantile mortality in India.

Infantile biliary cirrhosis only very rarely occurs in children who are exclusively breast fed. It is found, however, in such children if the child is given nothing but mother's milk for an unduly long time, e.g., for one and a half years. Here again the growing child does not receive adequate nutrition, either quantitatively or qualitatively, and the factor of partial starvation operates. As a rule, the milk of an Indian mother after her second delivery is insufficient for her child,—and utterly insufficient after the sixth to the eighth month. Christian women are more healthy, and I have never seen a case of infantile biliary cirrhosis among their children, and only two cases of rickets; in both the latter the mother's milk was supplemented by the "*aqua-milk*" feeds outlined above.

Cases of infantile biliary cirrhosis are curable only whilst the liver is still soft and whilst the child has an appetite. Once the liver is hard and fibrotic, the prognosis is very bad. A valuable supplementary food is fish, but mothers will never give it owing to a foolish belief that it is indigestible.

The Konkani cow has a very different milk yield from that of the well-fed and well-cared-for English cow. The original fat content of the former is not much above 1 per cent. The diluted "*aqua-milk*" is a white fluid with a most insipid taste. It is surprising indeed that infants fed on such a mixture do not succumb more rapidly than they do. Even if Indian cow's milk be given pure and undiluted, it will only afford adequate nutrition for some three months. After the third month the feeds should be supplemented in one way or another.

I would like here to especially stress the great value of buffalo milk in place of Indian cow's milk. The former is very readily obtainable, it contains a lot of cream, and if properly prepared it is a very good substitute for human

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milk. I have been advising it as a substitute for human milk in such cases for the last nine years, with excellent results. Finally, if the mother cannot be made to understand how to prepare the milk, Glaxo or Horlick's Malted Milk, with the addition of orange juice, are the next best substitutes.

The problem of infantile biliary cirrhosis is essentially an Indian one, and in view of the high mortality which attends this disease, it is time that its study was taken up upon scientific lines.

* * * * *

[*Note.*—We have submitted the above article to Dr. S. P. Bhattacharji, M.D., Offg. Professor of Tropical Medicine, Calcutta School of Tropical Medicine, who has had a lifelong experience of this disease as seen in Bengal and Madras. Dr. Bhattacharji writes as follows:—

"The article should certainly be published, as the author's views are very definite ones. As he invites criticism, however, there are a few points which I should like to comment on.

I do not agree with the author that the milk becomes fat-free when the cream is removed, as is done in Indian houses. The milk is never skimmed, but is boiled, then allowed to stand, and the thin layer of floating cream taken off. This does not deprive the milk of its total fat content; and the remaining fat, as tested in public health laboratories in this country, is sufficient to nourish a child. In Bengal I have seen a very large number of cases of infantile biliary cirrhosis and also cases in Madras, but have never found such a definite history of fat deprivation. I have seen good results ensue, even in well-established cases, when the infants were put on to skimmed milk with fruit juices. In others the symptoms appear to become worse when fat is administered. The author claims that the Indian method of preparing the feeds leads to the child getting sufficient proteins, but to a complete absence of fats, and a greatly reduced sugar content. My own experience in Bengal does not corroborate this. In a number of cases in which the exact dietaries were studied in detail, there was excess of sugar and deficiency of proteins. Cases were also encountered among children who were living on mother's milk alone.

I cannot follow what the author says about starvation of fat and sugar leading to hypertrophy of the liver. In famine there is starvation of fat and sugar, and just the reverse condition, atrophy of the liver and other organs, with hypertrophy of the adrenals. In animal experiments with fat-free diets there is atrophy of the liver, not hypertrophy. Further, the morbid anatomy of cases of infantile biliary cirrhosis of the liver shows that there is intralobular intercellular cirrhosis, with bile duct proliferation."—ED., *I. M. G.*]

OBSERVATIONS ON THE COMPOSITION OF HUMAN MILK IN BURMA.

By EDWIN H. BUNCE, F.I.C.,

Public Analyst to the Government of Burma, The Harcourt Butler Institute of Public Health, Rangoon.

IN all cases the specimens examined were obtained where the condition of the mother was perfectly satisfactory, and the infant increasing in weight.

It will be seen from the accompanying table that there is relatively little difference in composition between Burmese, Indian, Anglo-Indian, and European milk. In fact any of these results might have been obtained in Europe.

Composition.	Burmese. 1	Burmese. 2	Indian. 3	Indian. 4	Indian. 5	Anglo-Indian. 6	Average. 7	Average European (Richmond). 8
Water ..	87.60	88.41	86.54	87.42	88.24	87.52	87.62	88.20
Fat ..	3.70	3.40	3.90	3.00	2.80	3.00	3.30	3.30
Lactose ..	6.65	6.28	6.85	6.71	6.78	6.78	6.68	6.80
Proteins ..	1.79	1.67	2.44	2.61	1.93	2.46	2.15	1.50
Mineral matter.	0.26	0.24	0.27	0.26	0.25	0.24	0.25	0.20
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Comparing the average of the specimens examined with the average obtained by Richmond in England, the similarity is even more striking and no material difference is observed.

SCARLET FEVER IN BOMBAY.*

By P. T. PATEL, M.D. (Lond.), M.R.C.P. (Lond.), D.T.M. & H. (Cantab.), F.C.P.S. (Bom.),

Medical Superintendent, City Isolation Hospital, Arthur Road, and Maratha Hospital, Bombay.

History and incidence.—Scarlet fever is supposed to be prevalent in cold and temperate climates, and rare or sporadic in the tropics. Its prevalence in temperate regions of India was questioned until Gibson reported some cases in Poona in 1871. They were all in the children of a European regiment. After that various outbreaks have been reported amongst people coming from England and also locally in Calcutta and elsewhere, some of the cases being fatal in the Punjab, Calcutta, Bihar, the United Provinces, and the Central Provinces. Hatch reported 4 cases before the Medical Society of Bombay in 1893. Dr. Khory then said he had met with a case in a Parsi in 1878, but there is no detailed account of it. Rogers

* Being a paper read at the Medical and Veterinary Research Section of the Indian Science Congress held at Nagpur in January 1931.

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(1919) remarks that scarlet fever occurs in India as an imported infection, that there is no evidence that it is an indigenous disease, and that it rarely, if ever, attacks Indians; he does not report any cases seen by him. The object of this paper is to refute the above statement and to prove that scarlet fever like many other streptococcal infections does occur as an indigenous disease especially in Bombay, Calcutta, and other places and affects the Indian population as well as the others. Of course the infection is of a mild type generally, but it may be severe and fatal as in the cases reported before and in our series, and it does not spread so rapidly; for these reasons and also because the scarlet colour of the rash, which, when faint, is not noticed much in the brown or dark skins, sore throat and other symptoms are taken as due to influenza, and the real nature of the disease is missed. The first authentic account of scarlet fever in an Indian population is by Dr. K. C. Bose (1889) of Calcutta when he reported before the Calcutta Medical Society some cases he had seen with all the characteristics of scarlet fever during the previous 3 years. Some of them occurred in his own household and were confirmed by the Health Officers of the town, Drs. Macleod and Simpson. Dr. Macleod also drew attention to similar cases in 1881, but he did not come to any definite diagnosis then. Dr. Bose summarized the main features as follows:—

1. In every case there was sore throat, stiff neck and fever followed by the characteristic rash on the 2nd day of the illness.

2. There was no regularity in the rise and fall of the temperature, the highest temperature in some cases being 106°F. The temperature in the majority of cases became normal on the 5th morning, but in a few cases it kept high for several weeks.

3. In every case there was a distinct desquamative stage; the desquamation in some cases was so complete that the epidermis would peel off in regular sheets. The period of its occurrence was almost regular, in more than two-thirds of the cases it was observed on the 5th day; in rare instances it was noticed in the second week of the disease.

4. Eruptions were always red and distinctly visible at the flexures of the joints and neck.

He attributed the infection to the bad smell of the stinking drains in the houses. Then there are records of cases in Indians, in the army in 1892 and 1894 (Reports of the Sanitary Commissioner). Caddy and Cook (1899) reported two cases of a disease simulating scarlatina in Europeans in a Calcutta asylum, and dealt extensively with all cases of the disease reported before 1899. They were not able to find any source of infection, but one patient's throat and skin showed growth of a streptococcus on agar and broth which on inoculation into the calves produced a febrile attack of a definite duration and an eruption appearing on the second day, answering to the description of Klein and Power of the so-called "Hendon disease." They further observed that this streptococcus differed from *Streptococcus pyogenes* in the fever it produced and still more in producing no local reaction, pointing strongly to the conclusion that the streptococcus they obtained was the *Streptococcus scarlatinæ*. On the above report the Editor of the *Indian Medical Gazette* remarked that it is evident, contrary to the current opinion, that scarlatina does occur in India in cases apparently independent of infection from Europe, and it is probably confused with dengue, rubeola, etc. He started an inquiry by sending questions to all the readers, but the replies were negative except in 2 cases. At the same time the late Sir James Cantlie (1899 and 1900) also started a discussion whether scarlatina occurs in India in the *Journal of Tropical Medicine* and suggested that the diminished infective power of scarlatina is due to climatic conditions which may alter its form. K. MacLeod (1920) summarized the position as follows:—

1. Scarlet fever has often been imported by troopships and small epidemics in Indian native children have occurred.

2. Such epidemics were always of a very limited kind and have speedily died out.

3. They appear to have been more protracted in hill stations than on the plains.

4. Cases and groups of cases have been observed, the origin of which could not be ascertained.

5. The disease does not prevail epidemically among the indigenous races.

6. Cases of an exanthem closely resembling, if not identical with, scarlet fever, have appeared in Calcutta and elsewhere. These have been mostly single and limited to one family, and have shown no disposition to diffusion.

In Bombay the first case was noticed by me in 1922 in a late stage with marked peeling of the skin of the extremities and œdema and other signs of nephritis. Since then I have been seeing one or more typical cases of scarlet fever in the city every year. In 1928 one such case, described below, was sent to the Arthur Road Hospital, by the Resident Medical Officer of the J. J. Hospital on the 14th April for favour of opinion and diagnosis, with the remark that there were several such cases occurring lately. The following characteristics were noted:—

(1) Onset:—Sudden with sore throat followed by scarlet-coloured eruptions all over the body the next day.

(2) Nature of rash:—Punctate and erythematous, fading on pressure.

(3) Distribution:—On the whole body, but more marked on the neck and on the flexures of the joints.

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(4) Tongue:—Papillæ were prominent and surface was denuded of epithelium in some places; throat was congested and of scarlet colour.

(5) Urine:—This contained a trace of albumin.

A throat smear showed the presence of long-chained streptococci. Desquamation, which began during the second week, was of the pin-hole and flake type.

After that a series of cases were reported from May 1929 to January 1930 from the St. George's Hospital with rash, signs and symptoms of sepsis and peeling of the skin. Most of these cases were amongst Europeans. The majority of cases reported had fever, sore throat, generalized eruptions followed by peeling showing the main characteristics of scarlet fever and some had evidence of nephritis. Some of the members of the Malaria Commission of the League of Nations who saw these cases thought them to be of the nature of scarlet fever, but somehow many medical men in Bombay who saw these cases could not decide on a definite diagnosis and it was labelled as "the mystery disease" by the lay press; when I read the account in Europe I at once thought of the disease being scarlet fever and wrote to that effect to my friends. The blood examination, throat cultures, and complications, all showed the disease to be a streptococcal infection. These cases were transferred to the Arthur Road Fever Hospital in September 1929. Later there were admitted some more cases with all the characteristic features of scarlet fever. I saw these cases on my return from Europe by the end of October 1929 and there was no doubt about the diagnosis. I saw 4 other similar cases amongst Indians outside at that time. Since then many cases have been reported by practitioners in the city and have also been admitted to the hospital.

Case I.—F., male, Indian, aged 29, suddenly got high fever on the 14th October, 1929, with sore throat, joint pains and headache, then on about the third day (as noticed by the patient) eruptions of scarlet colour appeared on the whole body. He consulted a doctor, who advised him to keep to bed and take milk diet. The fever which was irregular subsided after about 10 days. He felt very ill all the time and had to keep in bed. The eruptions faded after six days and the skin began to peel beginning from the face; when I saw him he was peeling from the soles and palms in big flakes.

Case II.—J., female, Indian, aged 12, had high fever, sore throat on the 28th October, 1929, and scarlet coloured eruptions on the 30th October. The doctor who was attending was puzzled about the diagnosis and incidentally told me about the case and, on my expressing a desire to see her, was kind enough to show her to me. When I saw her she had the typical punctate erythema of scarlet fever all over the body and severe sore throat. The fever subsided in about a week and skin began to peel from the face downwards; she peeled completely all over the body and got quite well.

Case III.—Mr. D., an American engineer, residing in Bombay for some time, was admitted into the Arthur Road Hospital on the 2nd October, 1929. He had had an attack of fever during the preceding four days with sore throat, swelling of the submaxillary glands, pain in all the joints and a reddish flush on the body which was noticed on the second day of his illness. His doctor, an Englishman, diagnosed it as scarlet fever and sent him to the hospital. On admission the patient had a temperature of 102°F., pulse—110, respirations—25, and a diffuse punctate erythematous rash all over the body, but more distinctly marked on the face, axillæ, hips and lower extremities. The face looked slightly swollen with circumoral pallor and the tongue was thickly coated. The throat was congested and the submaxillary glands enlarged and tender. The rash disappeared on pressure and there was slight peeling of the skin of the neck in large flakes even in the earlier stages. His blood showed no parasites, his blood culture was sterile and his urine was clear throughout. The patient's temperature settled to normal after a couple of days. The desquamation of the skin was over the whole body and of the pin-hole type, except on the soles which was of the flake type and which was the last to clear, taking nearly five weeks. The patient was discharged cured on the 10th November, 1929.

Causation.

The cause of scarlet fever, as claimed by the Dicks, is a variety of *Streptococcus hæmolyticus* called *Streptococcus scarlatinæ* (Dicks). Still there is a great diversity of opinion even amongst eminent authorities on its ætiology. In a discussion on the ætiology, pathology and physiopathology of scarlet fever at the 20th French Congress of Medicine held in Montpellier, 1929, Professor Cantacuzene maintained that there is no scarlatinal streptococcus that is differentiable from other streptococci, and that the existence of a special virus of which the streptococcus is the transmitting agent must be assumed. In another paper M. Teissier and F. Coste renounced this hypothesis and supported in part the toxallergen theory of Dochez. In a third paper Sacquepee and Leigeois supported the theory of the special virus combined with the streptococcus. The discussion that developed following the presentation of the papers was somewhat confused, but in general the virus theory had the most supporters. At the International Congress of Microbiology held at the Pasteur Institute, Paris, on 20th July, 1930, again there was a discussion by several authorities on the ætiology and Professor Cantacuzene further maintained that the agglutinability by the serum of scarlet fever convalescents conferred on non-scarlatinal streptococci that are cultivated in contact with filtrates of cultures of scarlatinal streptococci, can be explained only by the existence of an ultravirus associated with the streptococci and carried by them. Dochez held that the hæmolytic variety of streptococcus, encountered in all scarlet-fever patients, must be regarded as an individualized and special type. It secretes a special toxin capable of producing all the symptoms of the disease. By repeated injections over a long period of time in the horse, one can obtain a serum capable of exerting a specific action when injected early. All human beings are exposed from childhood to infection by the hæmolytic streptococci and

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become thus gradually immunized. Some persons elaborate neutralizing substances that remain in the blood and make them less vulnerable. But the state of immunization and of sensitization passes through variable periods, and the appearance of scarlet fever is only an accident occurring during a period in which the immunity appears to have given away.

Friedman opposed the idea of a special strain of streptococcus being the causative agent in scarlet fever. There are only variable periods of virulence, depending on the season and possibly on the region. Treatment with the serum of convalescents has a high curative value.

Wandsworth does not believe in a specific pathogenic agent of scarlet fever, but considers the disease simply a manifestation of streptococcus infection, the nature of which depends rather on the susceptibility of the tissues than on the peculiar properties of the streptococcus that causes it.

In a recent address before the Society of American Bacteriologists, Hekton reviewed the evidence that points to the specificity of certain streptococci in the causation of scarlet fever and erysipelas and mentioned the careful, perhaps classic, observations of the Dicks as being the foremost.

Nicolle, Consell and Durand and Mariwaki report also the production of scarlet fever in volunteers by inoculating the throat with streptococci from patients who had scarlet fever. The conclusion has been drawn, therefore, that hæmolytic streptococci from scarlet fever, erysipelas and puerperal infection appear to produce toxins that are closely related if not identical.

Although this germ has been suspected to be the cause of this fever for the last 40 years, only recently—in 1923—the Dicks in America finally established it as the agent producing the disease, by experimentally producing the disease in animals, and established the specificity of the scarlatina toxins by immunity reactions. The bacteriological examination by cultural and other methods of all the throats and bloods of patients admitted to the Arthur Road Hospital and other hospitals by us and by other workers revealed that the infection is due to a streptococcus, but the exact specific characters of the variety cannot be determined as the particular agglutinating sera are not available in this country. Attempts were also made to identify the specific streptococci by animal experiment, but owing to the same difficulty the results were not definite.

Blood sera of two patients suffering from scarlet fever were sent to Dr. Petrie of the Lister Institute for testing and the following is a brief statement of his reply:—

(*i*) Convalescent scarlet fever sera are poor in anti-toxic content and hence difficult to titrate.

(*ii*) There is no satisfactory test of anti-toxin titre.

(*iii*) It is difficult to arrange for tests to be carried out on adult volunteers or indoor patients.

(*iv*) The description of the Bombay cases suggests scarlet fever or some infection by a hæmolytic streptococcus which secretes a toxin giving similar chemical effects.

(*v*) The consensus of British workers' opinion is that the streptococci of scarlet fever, puerperal fever, erysipelas and other pyogenic infections are closely related and the difference between them is only quantitative.

The Dicks have devised a test to find out whether a person is susceptible to scarlet fever, but it is considered unsatisfactory by many people, particularly Cantacuzene who styles it an irregular unstable reaction. He is of opinion that it has a general characteristic value with regard to all the scarlet fever infections and not the streptococcus alone.

The Schultz-Charlton reaction was done in 6 cases, but the results were negative. By this reaction if ½ to 1 c.c. of the serum from a normal person is injected into the skin of a scarlet fever patient with a rash, then the area round the injection becomes blanched. But this is also an indefinite test.

Source of infection.—This is always human and the discharges from the nose, throat and other places are infectious. This seems to be the case in the institution in Bombay, where 16 cases got the rash and symptoms of this fever one after another during a period of three months; they were admitted for other complaints and when proper precautions of disinfection and isolation were taken no further cases were noticed. But the source of infection cannot always be traced, as was the case in 9 of our hospital cases, which were admitted from different localities, and in some private cases in the city. It is contended and in some cases it is evident that the infection is imported from abroad by new-comers or through the post, parcels, books, etc., and we have in our series some instances of ships' crews, engineers and others getting the disease. Also many cases occurring in Europeans can be explained in that way, but I have seen cases in the city amongst Indians where there has been no chance of infection being imported. and I think that streptococci being ubiquitous take the form of this infection as suggested by Friedman and Wandsworth according to the climate and the resistance of the tissues of patients, producing the syndrome of scarlet fever in subtropical and tropical countries. It is interesting to note in this connection an account of a scarlet-fever-like disease mentioned by Dickson Wright under

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the heading of 'membranous forms of streptococcal throat infections with septic rashes.'

This type of case is frequently found on passenger vessels proceeding to the tropics, so much so that the name of "boat throat" has been coined for it. It is an exceptionally severe disease and closely resembles scarlet fever. The throat is most intensely inflamed, pus is seen in the tonsillar crypts, and small patches of membrane on the pharyngeal mucosa. The skin rash is a pin-point erythema as a rule. The severity of this disease was brought home vividly during the past year when nine deaths occurred on a Dutch liner returning from the tropics, and 70 per cent. of the passengers were infected. On this boat there was a mild outbreak on the outward passage with one death, and on the return voyage the disease recurred in the Red Sea with increased virulence.

The writer once experienced an epidemic on an outward-bound vessel. The cases commenced on entering the Red Sea, and eventually some half the passengers and crew were infected. After 10 days cases ceased to occur. There were no deaths, but some of the cases were extremely ill. The epidemics seem to start during the transition from tropical to temperate climates or *vice versa*. It seems as if the respiratory passages become infected with a new set of organisms at this time, and that immunity is not always acquired without considerable trouble. Anti-scarlet-fever serum should be carried on all steamers, as it is a specific in this condition.

If this is not streptococcal scarlet fever infection, what it is I do not know!

Also one of our cases of laryngeal diphtheria, developing typical scarlet fever in the hospital, shows that the infection is endemic and local and not always imported.

Case IV.—Miss M. was admitted at the Arthur Road Hospital on 16th July, 1930, with a history of fever, sore throat and difficulty of breathing of three days' duration. On examination both the tonsils were covered with membrane from which *B. diphtheriæ* were isolated. The submaxillary glands were enlarged, there was nasal discharge, and every now and then the patient got attacks of laryngeal obstruction. The urine showed albumin in traces; the pulse was rapid, of low tension and irregular. With continuous benzoin and eucalyptus steam inhalations, cardiac tonics and diphtheria antitoxin the patient improved remarkably. She had 17,000 units of serum intramuscularly on the 16th and 12,000 and 8,000 on the 17th and 18th respectively; the membrane had completely disappeared, the urine was clear and the pulse, breathing and temperature had become normal. On the 27th the patient had a sudden rise in temperature, with congestion and inflammation of the throat and erythematous flush on the face with circumoral pallor. The body also showed a typical scarlatinal rash which faded on pressure. Urine was again found to contain albumin in traces and the throat swab showed long-chained streptococci. Peeling of the pin-hole and flake type was first noticed at the root of the neck and the upper part of the back on the 29th. From this point it extended gradually both upwards and downwards, the face and extremities showing it on 1st August, 1930. On the 3rd the posterior cervical glands were swollen and tender. On the 5th the patient had acute pain in both the ears. The palms and soles were the last to show peeling, which appeared on the 10th. The urine was clear by the 14th and the patient maintained improvement and completely recovered. The patient developed symptoms of scarlet fever after transfer from one ward to another. The last ward had some scarlet fever cases 2 months before and the infection seems to have been conveyed by contacts or fomites from them.

Incubation period.—This is short, from 2 to 6 days; clinically there are mild, average and severe toxic types of cases.

Type of average severity.—Onset is usually sudden, with nausea in children, vomiting, and sore throat. In the remainder of the initial stage and through the fastigium, the skin is hot and dry as a rule, cheeks are flushed, the pulse is often quick (perhaps 150 or even more in children during the first day or so of the attack) and the temperature rises rapidly from the onset.

The rash is usually out within 24 hours of onset, occasionally not until far on in the second or third day, as in some of our cases; it is first seen on the neck, chest and below the angles of the scapulæ. There are punctate brick-red or scarlet elevations, many with hair at the centre. Besides punctation a diffuse erythema is present; in an intense rash, points may be merged in the erythema. The skin is slightly swollen especially on the fingers. It was so in one of our cases. The rash disappears on pressure. Some scattered coarser papules are not uncommon where the skin is rough (outer side of the limbs, especially the legs); certain areas (about neck, axilla, front of elbows) may show petechiæ without the case being of the hæmorrhagic type. On the extremities the rash appears more or less blotchy. Face, palms, soles and cheeks are very red. One case in our series had a hæmorrhagic rash particularly marked on the limbs, and on the front and back of the trunk.

Case V.—Mr. M., aged 31, a wireless operator, was admitted into the St. George's Hospital on 17th October, 1929, for vomiting, abdominal pain and irregular fever. He ran a low temperature between 99°F. and 100°F. from the 17th to the 24th and high temperature between 100°F. and 104°F. from the 25th to the 29th; his blood showed no parasites, blood culture was sterile and the Widal test was negative. He was treated with injections of intravenous quinine and also large doses by the mouth without effect on the temperature. On 14th November, 1929, he developed a hæmorrhagic rash all over the body, with the exception of the face, for which he was transferred to the Arthur Road Hospital; he had a petechial rash all over the body, the face being practically free. The rash was confluent on the dorsum of the wrists. The intervening skin in between the petechiæ was normal. The rash did not fade on pressure. The throat was congested with submucous hæmorrhages on the palate and buccal mucosa and culture from it showed long-chained streptococci. The urine showed albumin in traces with a few hyaline casts. Blood showed a leucocytosis—27,840 per c.mm.

Blood and urine culture were sterile. The Schultz-Charlton reaction was negative. He had a temperature of 101.9°F. on admission and under the usual alkaline citrate treatment it came to normal after two days. The rash gradually faded after a week. It seems that

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this patient had also a streptococcal infection like others from the St. George's Hospital and developed a hæmorrhagic rash after large doses of quinine, being more susceptible to it than others.

The rash of scarlet fever reaches its height on the 2nd or 3rd day of attack. The temperature which is usually about 103°F. after 24 hours may rise a little further during this time. The tongue of scarlet fever shows three stages; it is furred all over and has red edges during the first day or so, it reaches the strawberry condition as a result of peeling, and is then raw looking and very red, showing enlarged papillæ (which may be hidden by the fur in the earlier stages). The strawberry and the later raw tongue of this type, along with high temperature, is rarely seen in any other disease. Two of our cases showed this type of tongue very well.

Case VI.—A. J., aged 28, a European electrical engineer, recently arrived from England (2 months before), was taken ill suddenly on 31st December, 1929, with high fever, sore throat, vomiting and diarrhœa. He was sent to the Arthur Road Hospital on the third day of illness with a temperature of 101°F., pulse 100, respiration 25, and an erythematous flush all over the body disappearing on pressure and more marked around the root of the neck, shoulders, back and palms. There was typical circumoral pallor. The throat was congested and throat swab showed long-chained streptococci on culture. The patient was put on alkaline citrate mixture and his temperature came down gradually by lysis on the 7th day of his illness. He had epistaxis before that. He again had a rise of temperature next day which continued to run an irregular course. Intravenous injections of 20 c.c. of Meyer's combination anti-scarlet-fever serum were given on alternate days and the temperature came down to normal after two weeks. On the 11th day of his illness the patient showed typical pin-hole peeling on the front of the wrists, which gradually extended over the whole of the trunk in a sort of powdery desquamation, the soles of the feet being the last to clear, taking about three weeks. On the 13th day of his illness the patient had acute pain in the right ear and subsequently developed otitis media as a complication with perforation of the membrane and sanguinous discharge which showed streptococci. On the 30th day he had a peritonsillar abscess which had to be incised. After this the patient continued to do well.

Sore throat.—Usually the tonsils are more or less enlarged. An abscess may form as in our Case VI. The faucial pillars and palate are very red; the palate redness may be rash-like, perhaps spotty and yellowish; there may be mucus or mucopurulent discharge from the throat and besides soreness there is pain on swallowing; external cervical tenderness is common; often the glands at the angle of the jaw are tender, and sometimes palpably inflamed; enlarged lymphatic glands can sometimes be felt in the axillæ and the groins.

The urine is febrile and shows a trace of albumin. Albuminuria may merge into complicating nephritis or continue for some days as in a few of our cases. Oftener such nephritis occurs as a separate and later incident.

The decline.—In most cases the rash disappears and the patient is convalescent by the 7th or 8th day. The rash lingers where it is most marked, that is, about the neck and axillæ. Defervescence occupies on an average three or four days as in most of our cases.

Convalescence.—Desquamation is the main feature of this stage, although even while the rash is still at its height scales may be seen on the cheeks, and before it has faded the process may be obvious on the ears and about the neck. The epidermis becomes rather opaque and parchment-like as a rule before definite peeling sets in; this condition is first observed on the ears. The face, ears and neck and chest commonly show desquamation first. Desquamation of scarlet fever is typically of the pin-hole and flake type. The pin-holes are represented by minute perforations where there has been one of the small papules. The flake form of desquamation is specially apt to occur where the epidermis is hard and thick; on the palms, soles and front of knees. Sometimes a large mass comes off the finger or even the greater part of the hand like a rubber glove, as one of our patients described it. If the desquamation is deep, as is likely when the rash is intense, it happens at times that the denuded surface is tender. Sometimes the hands and feet remain rough long after proper desquamation is complete.

The patient may peel twice or thrice; this applies particularly to the soles. As a rule desquamation is finished in about 6 weeks, occasionally earlier. The hair may be partly lost for a time. It is said that the nails may be shed. When the type is severe, especially in septic cases, there may be prolonged debility, perhaps accompanied by some of the sequelæ, such as chronic otitis, rhinitis or adenitis.

Toxic type.—In this the toxin seems to act with unusual severity and some of the cases first seen at St. George's Hospital were probably of this type. As a rule, pyrexia is marked, but it may become less so as a progressive result of general depression, particularly in cases tending to a fatal issue. The rash may be patchy and very scanty (often with pallor of the unaffected parts of the skin); or it may be very intense. If circulation fails the rash on the extremities may become purplish. Heart and pulse conditions indicate a tendency to failure. The heart may be degenerated and dilated and death from gradual or rather sudden heart failure is common. The pulmonary condition is in keeping with the febrile state and weakened circulation. Delirium is common and often persistent, especially after childhood; persistent insomnia is a marked and ominous feature. Fatal cases may pass into a state of stupor. Sometimes the picture may be like diphtheria or typhoid fever in some aspects. In puerperal scarlet fever there are symptoms of severe septicæmia with the rash after delivery.

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Complications.

1. Nephritis.
2. Septic scarlet fever.
3. Otitis media (Case VI)
4. Arthritis (Case VII).
5. Cardiac affections.

Case VII.—Mr. H., aged 36, European, a wireless operator, was transferred to the Arthur Road Hospital on the 1st September, 1929, from the St. George's Hospital where he was under treatment during the preceding forty-one days for intermittent fever and dyspeptic symptoms. His blood showed no parasites. His Widal reaction was negative and his blood culture was sterile. He was put on intravenous injections of 10 grs. of quinine daily and 30 grs. by mouth for five days and then he developed a rash all over the body on 30th July, 1929, for which he was treated with anti-streptococcal serum and intravenous injections of 0.4 per cent. mercurochrome in 5 to 15 c.c. doses. The rash almost disappeared by 7th August, 1929, but there was a recrudescence of the rash on the 9th. The patient continued to run an irregular temperature and on admission into the Arthur Road Hospital he showed peeling of the skin in large flakes, especially on the front of the wrists, the feet and the soles. The peeling was complete by 4th September, 1929. On the 18th the patient developed acute maniacal symptoms from which he recovered after a fortnight with sedatives. His temperature continued to run an irregular course, in spite of all measures and his urine showed albumin in traces with hyaline and granular casts. From 1st October, 1929, the patient began to run a hectic temperature with sweating and pain with impaired movements of the right hip joint. His blood showed a marked leucocytosis—16,000 per c.mm.—with a relative increase of polymorphonuclears; suppuration in the right hip joint was suspected and the patient transferred to St. George's Hospital for surgical treatment on 19th November, 1929, where a large amount of pus was aspirated from the joint; a hæmolytic streptococcus was isolated from the pus; he expired after a week.

Diagnosis of scarlet fever.—The main points are as follows:—

1. Sudden onset.
2. Sore throat.
3. In children, marked early rapidity of pulse.
4. Vomiting.
5. Redness of cheeks, and in marked contrast with it circumoral pallor.
6. Rash within about 24 hours.
7. Punctate erythematous rash with diffuse blush.
8. Tongue:
   (*a*) Furred all over except red point and edges.
   (*b*) Peeling.
   (*c*) Strawberry.
9. Sallowness of skin after rash has gone.
10. Pin-hole and flake desquamation.

In doubtful cases Dicks' test and the Schultz-Charlton reaction are useful within the first three days.

In the late stage, nephritis is a highly suggestive complication, arthritis is fairly so; otitis has small value. Late, lingering coarse punctation on the outer side of the legs is useful.

The differential diagnosis from the rashes caused by reagents mentioned below is important:—

(*a*) Rashes due to the following chemical poisons:—

Mercury, iodine, bichromate, arsenic, antipyrin, carbolic acid, chlorate of potassium, and chloral.

(*b*) Rashes due to the following vegetable poisons:—

Belladonna, stramonium, hyoscyamus, quinine (Case V), opium and morphia, copaiba, cubebs, and salicylate or acid salicylic.

(*c*) Rashes due to the following animal substances:—Horse serum, food poisoning, and soap (enema rash).

Treatment.

Prophylaxis.—By serum. Ramon and Debre advise using scarlatinal anatoxin prepared by them like diphtheria anatoxin used in the acute immunization of that disease. Five to 10 c.c. is given intramuscularly according to age and then, if the Dicks' test is positive, it is repeated again. Ramon inoculates the scarlatinal toxin by the nasal route also.

Schottmüller tried, as the active immunity is not effective for a few weeks and the passive immunity lasts only for a week or two, a combination of the two in 175 cases. All these children were inoculated with 10 c.c. of immune serum plus 1 c.c. of Gabritschewsky toxin; later, 2nd and then 3rd injections of the toxin were given; there were no serious after-effects and the results were good.

The quarantine period is 8 days and notification and isolation should be done as in other infectious diseases.

Specific or serum treatment.—The comparative value of (*a*) convalescent scarlet-fever serum and (*b*) Dochez's scarlatinal and streptococcus serum in the treatment of severe cases of scarlet fever, as given by Dochez, is as follows:—

Some cases were treated by intramuscular injections of from 15 to 85 c.c. of serum from convalescent cases of scarlet fever. A rapid improvement in the general symptoms followed with a slight fall in the temperature and pulse rate, but no effect on the rash was noticed. The convalescence was not shortened nor was the incidence of septic complications, during convalescence, reduced. A comparative study of 31 cases of scarlet fever showed that the intramuscular injections of Dochez's scarlatinal anti-streptococcus serum, in amounts of 40 c.c. administered during the first three days of the disease, caused a prompt disappearance of the toxæmia, a critical fall in the temperature and pulse rate, prompt fading of the general exanthema and rapid disappearance of the glandular enlargement. A therapeutic dose of 40 c.c. of Dochez's serum was sufficient to bring about a clinical cure in moderately severe cases of scarlet fever. Septic complications yielded slowly and irregularly to Dochez's serum. We have treated our cases, accompanied

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by septic symptoms, successfully with a serum prepared by Fritz Meyer on the principle of combination with ordinary anti-streptococcal serum.

F. van Bormann records his observations on 694 cases of scarlet fever treated with antitoxin, and on 292 controls. The dose used was always 25 c.cms. of unconcentrated or 10 c.cms. of refined antitoxin and, except in the severest cases, a repetition of the dose was not necessary. The weight and age of the patients were not taken into consideration. The injections were given intramuscularly, except in the severest cases which had intravenous injections. In the majority of cases the antitoxin used was that supplied by the Behring works at Marburg, but a weaker Vienna serum, an American serum, and a Saxon serum were also employed. The cases fell into three groups: (1) a toxic group in which the initial symptoms were pronounced, including a subgroup of fulminating cases, (2) a very mild group in which the toxic and septic symptoms of the initial stage were ill-marked and the temperature did not rise above 101.3°F., and (3) a septic group, in which the clinical picture was characterized by complications from the first. The onset of desquamation did not appear to be affected by the injections unless perhaps it was a little accelerated. No influence, however, was noticed on its duration or character. In toxic cases the temperature curve was the best indication of the action of the serum, especially as the fall of temperature was accompanied by general improvement in all toxic symptoms, such as rapid pulse, malaise, and cerebral manifestations. As a rule there was a rapid fall of temperature to a subfebrile level within twelve to twenty-four hours after injection; the throat condition also showed a considerable improvement.

General treatment.

(*a*) The patient should be in bed at least in the first week of convalescence, if cold weather, through the 2nd or 3rd weeks. Test the urine regularly until albumin is not found. General treatment of febrile conditions with alkaline, salicylic and diaphoretic mixtures should be adopted.

(*b*) *To clear hard peeling from the feet.*—Steep in very weak potassium permanganate solution as in smallpox and use pumice stone gently and then apply oil of eucalyptus in sweet oil (1 in 40).

(*c*) *Adenitis.*—Foment four-hourly; for abscess and bull neck boracic fomentations and perhaps some small incisions are required.

(*d*) *Nephritis.*—Put the patient between blankets and dress in woollen clothes with flannel binder round loins. Plenty of water with sodium bicarbonate and potassium citrate should be given. If uræmia, caffein and sodium benzoate, grs. 3 each to be given as a hypodermic injection, and repeated at intervals. Encourage sweating by hot packs, vapour or hot air baths and control convulsions by chloroform inhalations. If asphyxial element is present, pull out tongue and use oxygen.

Selected cases of uræmia require bleeding, even in the case of children, 2 to 10 ounces, very rarely more. In persistent slight albuminuria after convalescence protein food is not withheld. The patient is allowed to be up after 6 or 8 weeks.

Arthritis (scarlatinal rheumatism).—Put cotton-wool round joints. Sodium salicylate, 10 to 15 grs. internally, and local application of liniment methyl salicylate is useful.

Conclusions.

1. Scarlet fever is an indigenous disease in India, particularly in big cities, hill stations and other places.
2. It has no tendency to spread in an epidemic form and even if a case occurs in a household other members, generally children, escape.
3. It is due to infection by a streptococcus, which is not generally virulent and hæmolytic, but may assume these characters if favourable conditions of climate, low resistance of tissues, etc., are present.
4. Clinically the infection has its specific characters and special features similar to those observed in cases seen in cold countries like Europe and some parts of America.
5. Prophylactically, as well as therapeutically, scarlet-fever serum is effective in lessening the severity and duration of the disease.

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OVARIAN TUMOURS.

A TEN YEARS' RECORD OF 547 CASES.*

By V. B. GREEN-ARMYTAGE, M.D.,
F.R.C.P. (Lond.), F.C.O.G.,
LIEUTENANT-COLONEL, I.M.S.,
Professor of Midwifery and Gynæcology, Calcutta Medical College, and Surgeon to the Eden Hospital for Women, Calcutta.

I DO not know of any existing statistics which deal with the frequency and operation results of tumours of the ovary in India, therefore it

* Being a paper read at the Medical and Veterinary Research Section of the Indian Science Congress held at Nagpur in January 1931.

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may serve some useful purpose to recount personal experiences over a period of ten years; for tumours of the ovary are most frequent in tropical and subtropical countries. For the purpose of this paper my registrar, Dr. K. Dutta, has carefully gone through the medical history sheets and private records of all cases operated upon at the Eden Hospital and in private practice from January 1919 until June 1930 and has only recorded those cases which were pathologically tumours of the ovary.

During this period 13,422 gynæcological patients were admitted into hospital. Of these 437 had tumours of the ovary proper, which makes a percentage of 3.25. During the same period 110 patients were operated upon for broad-ligament or fimbrial cysts.

It is a common error of practitioners in India to consider tumours of the ovary as of small importance and little malignancy, with the result that tumours are allowed to persist until they reach enormous proportions, indeed, proportions which are unbelievable in Europe today, but which were seen by Lawson Tait and Spencer Wells fifty years ago in Great Britain. The result of such procrastination in India is that patients arrive in hospital often so cachetic that operation is fraught with great anxiety. Moreover, it is frequently found as a result of delay that malignancy has occurred in a simple tumour.

Nationality.

Out of 437 cases of ovarian tumours 324 were Asiatic patients of every nationality in the Peninsula and 113 were Europeans and Anglo-Indians. Of the 110 broad-ligament cysts 90 were in Bengalis and 20 were in Europeans and Anglo-Indians.

Age incidence.

Of the ovarian tumours there were—

35 cases between the ages of 12 and 20
299 „ „ „ „ „ 20 and 40
99 „ „ „ „ „ 40 and 60
3 „ „ „ „ „ 60 and 70 and
1 case „ „ „ „ 70 and 80

Of the broad-ligament cysts there were—

7 cases between the ages of 12 and 20
78 „ „ „ „ „ 20 and 40 and
25 „ „ „ „ „ 40 and 60.

Pathology.

Of the ovarian tumours 38 were dermoid cysts, 45 were papilliferous cysts and 59 were definitely malignant (adeno-carcinoma): 257 were simple cysts and of these 37 were twisted cysts containing blood and 38 were chocolate cysts (endo-metriomata).

Malignancy.

Out of a total of 437 cases 95 (i.e., 21.7 per cent.) proved to be microscopically malignant, and of these 25 were totally inoperable, the abdomen being closed without anything being done.

These statistics are of peculiar importance to us in India, for in Doderlein's clinic the incidence of malignancy was 10 per cent. whereas in Lippert's it was 15.5 per cent. This high incidence of malignancy in my series of cases, namely, 21.7 per cent., justifies the opinion that the delay in coming to operation, so common in the East, predisposes to secondary malignant changes.

Mortality.

The death rate for 342 benign ovarian tumours was 10, or 2.9 per cent. The death rate for the malignant ones was 23 out of 95, or 24.2 per cent. Of the broad-ligament cysts the death rate was 8, which is 7.27 per cent.

Ovarian cysts complicating pregnancy.

There were 15 benign and one malignant cyst of the ovary complicating pregnancy. All of these patients were operated upon and all recovered without immediate abortion. The malignant case, however, died when she was seven months pregnant from a recurrence in the lung.

Such statistics though wearying are, I consider, of prime importance from the point of view of the general practitioner; for there can be no question that early diagnosis and treatment would have saved the life of many of these cases which arrived too late in hospital.

Operative technique.

I should like to stress some points of particular importance from an operative point of view, for twenty years at the Eden Hospital has taught one a clinical sense which is difficult to overrate or describe.

(1) Never hurry the date of operation; keep the patient in bed until such time as heart and kidney function are normal. These patients are frequently constipated and infected with worms, therefore santonin and gentle purgation should be the rule on admission.

(2) With a view to inhibiting shock and assisting heart muscle I give honey—an ounce 3 times a day, and a liberal diet for a week at least.

(3) These patients are frequently wizened and cachetic, therefore before operation is begun, and from the first moment of anæsthesia, I give intravenously one pint of 20 per cent. solution of Martindale's glucose at the rate of one drachm per minute, and at the time of operation a long roller towel is placed around the patient's waist immediately below the costal margin. One dresser takes each end and as the tumour is removed or emptied, gentle compression of the abdomen is made by pulling upon the towel. By this means the abdominal pressure is maintained, and filling up of the splanchnic vessels, due to a negative pressure consequent upon the emptying of the abdomen, prevented. Moreover by this means

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any sudden movement of the heart downwards as a result of release of tension upon the diaphragm is prevented. I am sure that this simple procedure is one of great importance and should not be forgotten.

(4) In the case of very large tumours the pressure on the diaphragm may be so great as to be a cause of cyanosis. In such a case open ether and oxygen are given, with the patient in a slightly prone position and not the Trendelenberg. Recently I have had excellent results from the use of Avertin anæsthesia in such cases.

(5) The abdomen having been opened it is all-important to separate adhesions, so far as is possible, with the hand between the tumour and the abdominal wall, for by so doing there is less shock and less likelihood of pulling upon the omentum.

(6) It is wise to make the original incision large, but care should be taken that the bladder is not injured, for in some tumours, particularly those of the broad ligament, the bladder may be pulled up as high as the umbilicus and therefore may easily be incised.

(7) With the hand in the abdomen reaching down into the pelvis it is of importance to discover the position of the fundus uteri, for that gives you anatomical *éclairage*.

(8) Whenever possible the tumour should be eventrated entirely out of the abdominal incision and then with a swab it is usually quite easy to separate adhesions of the omentum and intestines which are frequently present on the fundus and posterior surface of the tumour.

(9) At times the immense size of the tumour does not permit of eventration. In such cases one or many loculi must be tapped before this can be done.

(10) In the event of the gut being greatly involved in, or adherent to, the walls of the tumour, it is best to make a thin incision in the wall of the tumour and free the bowel along with a portion of the wall of the cyst, rather than resect the bowel or desist from operation.

(11) In all cases of ovarian tumour the opposite ovary should be inspected and should there be the slightest aspect of morbidity or if the tumour removed proves to be papillomatous or malignant the opposite ovary with or without the uterus should be extirpated.

(12) Large broad-ligament cysts will often give the greatest anxiety, for the bowel, bladder and ureter are frequently displaced and may become torn or cut. It is no uncommon thing to find the ureter in a retro-peritoneal broad-ligament cyst displaced high up over the anterior surface of the tumour. If this be not remembered it may be cut or treated as the round ligament with fatal results.

(13) In most cases of broad-ligament cysts removal of the uterus along with the tumour is the best and easiest plan.

(14) In such a case big veins at the base of the broad ligament may cause much hæmorrhage. Every endeavour should be made to stop such bleeding by under-pinning, using either a Worrel needle or a curved needle threaded backwards.

(15) In the case of a simple ovarian tumour the ligated pedicle should be buried in the folds of the broad ligament and the uterus should be ventro-fixed before closing the abdomen so as to prevent it retroverting and giving rise to future symptoms, but where there is a papilliferous tumour with or without ascites and you have to do a hysterectomy along with removal of the opposite ovary, it is imperative to see that all raw surfaces are peritonized before closing the abdomen.

(16) Just before closing the abdomen it is always wise to look into each loin and mop out any jellified collection of blood and serum present. Moreover, frequently small oozing tags on the omentum are seen which may be tied. Finally, the omentum or "abdominal policeman" should be brought down to the pelvis.

(17) Formerly I used to pour a quart of saline into the abdomen as the incision was being sutured, but I have given that up in favour of breast saline.

(18) As regards clinical diagnosis, if the tumour is slightly mobile, if it is without pain or tenderness, if there is ascites and no temperature, it is almost certain that the tumour is innocent, whereas if the reverse conditions are present then it is malignant.

(19) Finally remember two aphorisms of surgery: (1) That it requires greater moral courage to stop and close the abdomen in the early stages of an operation when you find the condition inoperable, or malignant, than to proceed and kill the patient thereby on the table, and (2) that these patients in India will test, to the utmost, your clinical ability to gauge correctly their vital resistance.

I am very much indebted, for the great labour entailed in looking up the case history sheets, to Dr. K. Dutta, Registrar of the Eden Hospital.

AN IMPROVED TYPE OF OBSTETRIC BEDSTEAD.

By S. N. HAYES,
MAJOR, I.M.S.,
Medical Superintendent, Government Hospital for Women and Children, Lahore.

A BEDSTEAD made to my design* for use in the Government Hospital for Women and Children, Lahore, has proved satisfactory after nine months' trial; it presents certain new features.

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*By Messrs. Whitfields Bedsteads, Ltd., 10, Dane Street, High Holborn, London, W.C. 1.

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The patient lies on an ordinary cotton mattress which is placed over the spring-mesh mattress.

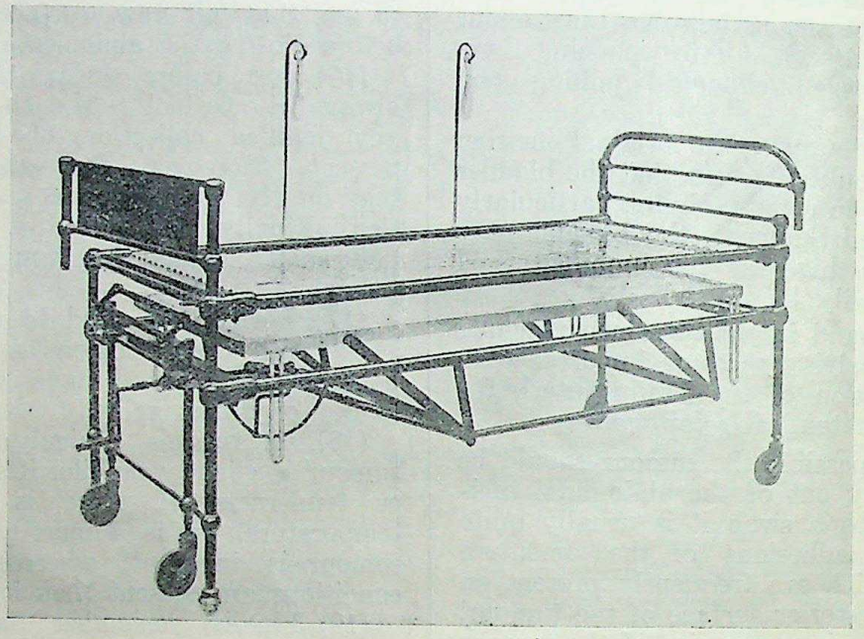
Underneath the spring mesh is a zinc plate which can be raised or lowered at will.

The plate is kept lowered until nearly the end of the second stage of labour when the plate is raised, converting the spring mesh into a solid base.

All the comforts of a spring bed are thus obtained until towards the end of labour.

Lithotomy stirrups can be placed at the side or foot end of the bed.

The head and foot ends are removable—on the latter is a plate against which the feet can be placed. Large fibre ball-bearing castors are provided. The foot end also has stub feet and a lifting mechanism which enables it to be raised on to the castors; the bed can then be wheeled easily.



REMOVAL OF FOREIGN BODIES FROM THE ŒSOPHAGUS BY EXTERNAL MANIPULATION.

By CAPTAIN D. H. VARIAVA,
Assistant Chief Medical Officer, Nawanagar State.

THIS short paper is based on a case of a round foreign body in the œsophagus just above the level of the supra-sternal notch, which was removed by external manipulation under general anæsthesia.

On 7th December, 1930, I. B., aged 15 years, was brought to the Victoria Jubilee Hospital, Jamnagar, at 10-30 p.m. with the history of having swallowed a two-pice piece (as big as an English penny) at noon and that it had stuck in the œsophagus. The boy was experiencing pain just above the supra-sternal notch on drinking water and was unable to swallow solid food.

I was called to see the patient. On external examination nothing was felt but the boy complained of pain just above the supra-sternal notch.

Laryngoscopic examination was negative.

The patient was screened and an *x*-ray plate taken at 11 p.m. the same night. On the screen, the two-pice piece was seen just above the sternal notch.

The patient was put under chloroform and in the absence of a bronchoscope, which had been sent out for repairs, attempts were made to remove the coin with long forceps, but without success. The patient was allowed to come round. I again tried to feel the foreign body from outside but the rigidity of muscles due to pain prevented this. Then suddenly the idea struck me that under anæsthesia all the muscles of the neck would relax and would allow the foreign body to be removed by external manipulation. Anatomically the idea appeared quite sound. The patient was again put under chloroform. By external palpation with the fingers of the right hand, the coin was very easily felt in the œsophagus just above the sternal notch. The œsophagus was squeezed between the thumb and fingers of the right hand distal to the coin and the coin in this way was manipulated upwards towards the pharynx. The coin came into the pharynx and lay free there, it was then picked up with the left hand from the mouth, the whole manipulation taking less than half a minute. This is the first time that I have used external manipulation for removing a foreign body from the œsophagus under general anæsthesia. I have never heard, nor read, about external manipulation for removing a foreign body from the gullet.

There are certain advantages and limitations to this method.

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Advantages.

1. In small towns and villages where special instruments and other facilities are not available, this method is simple and safe both for the patient and doctor.

2. In children and persons with thin necks, the method is ideal.

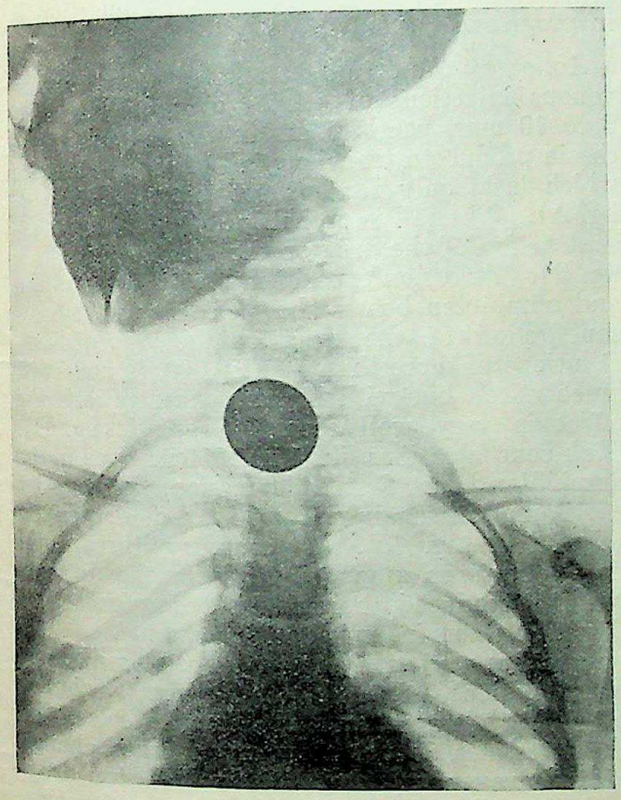
3. It is very quick.

4. Even with all facilities, such as the bronchoscope, etc., if the conditions as stated below for external manipulations are fulfilled, the latter method should be preferred as being simpler and quicker.

5. *X*-ray is not always necessary. Palpation under anæsthesia and the pain felt by the patient will indicate the position of the foreign body.

Limitations.

1. The foreign body in the œsophagus must not have sharp ends or angles nor should it be



rough. It should be more or less smooth with rounded angles no matter of what shape. Quite round or cylindrical smooth bodies are ideal for this method. Rough and angular bodies are a contra-indication to external manipulation as it will injure the mucous membrane of the œsophagus and may prove very dangerous.

2. The foreign body should be just above the level of the supra-sternal notch, otherwise it would be impossible to get at it by external manipulation. In short it must be felt by external palpation before removal.

3. General anæsthesia is always necessary. One would be surprised at the amount of relaxation of the neck muscles under anæsthesia.

4. The patient should have a normally thick neck. If the neck is very thick and short then even under anæsthesia it will be difficult to get at the foreign body from outside.

It will be of interest to know if this method has been practised before by anyone.

The *x*-ray picture shows the position of the foreign body. It is also interesting to note the cervical rib which is present on the right side. The diameter of the two-pice piece is 3 centimetres.

My thanks are due to Dr. R. C. Thomas, F.R.C.S., the Chief Medical Officer, Nawanagar State, for allowing me to publish this case.

A PRELIMINARY NOTE ON THE ACTIONS AND USES OF "ALEPOL."

By B. B. DIKSHIT,
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and
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ALEPOL is a sodium salt of a selected fraction of the less irritating, lower melting-point fatty acids of hydnocarpus oil (manufactured by Burroughs Wellcome & Co.). The use of hydnocarpus oil is now well established in the chemotherapy of leprosy and either the oil or some salts or esters prepared from it are widely used all over the world. The one disadvantage which is associated with the treatment of leprosy with hydnocarpus oil is its irritating nature, especially a brand which is not prepared with the necessary precautions. Endeavours are therefore made from time to time to get a preparation which will retain the curative properties of the original oil without having its irritating effects. Alepol is one of such products, and there is no doubt that comparatively this preparation is to a considerable extent free from marked irritant action. We have used the preparation in the King George's Hospital, Vizagapatam, for the last six months. We are fully aware of the fact that although we can say something about its irritant action, our experience is too limited to pass an opinion about its curative properties. We have, however, studied in the laboratory the pharmacological action of the drug, and the results in a few cases treated with Alepol are encouraging. We have therefore undertaken to report our observations both experimental and clinical.

Alepol is a soap readily soluble in water, the solution being alkaline to litmus. The manufacturers advise a strength of 3 per cent. for intramuscular injections and 1 per cent. for intravenous use, the dose varying from 1 to 5 c.cs. or more, gradually increased. We have so far used only intramuscular injections in

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3 per cent. strengths. We start with 1 c.c. intramuscularly twice a week, and the dose is increased by 0.5 c.c. every week till the patient gets 5 c.cs. From our experimental work we are inclined to believe that the dose can be considerably increased but not the strength. Strengths higher than 3 per cent. are liable to give pain due to the irritant action of the drug.

Experimental.

Toxicity.—The toxicity of the drug is fairly low. Rabbits can tolerate 25 mg. per kilo of body weight without any untoward effects. The lethal dose will be considerably higher than this dose. Hypodermically cats can tolerate 150 mgs. per kilo without any appreciably bad effects. Two hundred and fifty mgs. have not proved immediately fatal in our series, although the animal is decidedly in a bad condition and loses weight rapidly. The detailed study of toxicity will be dealt with in a separate paper.

Absorption.—Absorption is fairly rapid when given by hypodermic or intramuscular methods. Oral administration leads to anorexia, vomiting and loss of weight in animals, due to the irritant action of the drug on the gastro-intestinal tract.

Local action.—Even a strong solution of Alepol applied to the intact skin does not produce any effect on the skin. There is not the slightest irritation or any evidence of any rubefacient action. Being a soap, however, it has got an irritant action on mucous membranes. A 1 per cent. solution instilled into the eye of a rabbit produces congestion in the eye. The action is more marked with 3 per cent. strength. There is a marked congestion of the eyes, the animal becomes restless and tries to brush off the solution from its eyes. Intramuscular injections of 3 per cent. solutions do not produce any marked irritation in kittens. Higher concentrations like 5 per cent. produce a fairly marked inflammatory reaction, and 10 per cent. solutions lead to necrosis at the site of the injections. As regards the action on the veins, we are inclined to believe that Muir's technique of withdrawing the blood in the syringe and mixing it with the more irritant salts of hydnocarpus oil, is less irritating than the direct action of Alepol on the vessel endothelium.

Action on the blood.—Of all the actions of the drug on the different tissues of the body, the action on the blood appears to be the most important. If in a series of tubes containing a small quantity of 10 per cent., 5 per cent., 1 per cent., 0.5 per cent., and 0.1 per cent. strengths of Alepol, a few drops of defibrinated blood are added, the remarkable hæmolytic action of the drug on the red blood corpuscles can be seen immediately. The blood goes down to the bottom of the tube in a darkish mass, and the supernatant fluid becomes tinted with a darkish colour. The action is somewhat delayed in the last two tubes, but is quite definite. Control experiments with ordinary washing soap show exactly the same action both qualitatively as well as quantitatively, while the red blood corpuscles remain quite intact in Locke's solution. The hæmolytic action can very well be seen under the microscope, when different strengths of Alepol solution and blood are brought in contact under the field. The red blood corpuscles gradually disappear, so that in a few minutes the field becomes quite clear. The solvent action of the drug on the red blood cells is very marked with strengths higher than 1 per cent., while with lower concentrations the effect is somewhat delayed. The solvent action of the soap as well as the hypotonicity of the solutions are, we think, the causes of the very marked hæmolytic action. If Alepol solutions are prepared in Locke's solution, the hæmolytic action is delayed. Further work in this connection is in progress.

Action on the cardio-vascular system.—Intravenous injections of Alepol given in doses of 5 to 10 mgs. per kilo. in animals under anæsthesia produce a transient fall of blood-pressure which lasts only for a short time (Graph I, fig. A). The fall is probably due to the depressant action of the drug on the heart (Graph I, fig. B). Perfusion experiments with mammalian and amphibian hearts show clearly the depressant action of the drug on the myocardium. Dilutions of more than 1 in 50,000 do not show much effect, but with higher concentrations the effect is very well seen (Graph I, fig. D). High concentrations like 1 in 1,000 produce in the amphibian heart first a depression, followed by a stimulation again followed by a depression (Graph I, fig. C). In ordinary therapeutic doses, however, none of these marked effects will be produced, because the drug goes into the circulation in much diluted strengths. The only effect that may be produced is a slight and transient fall of blood-pressure. Volumes of intra-abdominal organs like the spleen or the intestines do not show any marked change after intravenous administration of the drug, and generally vary as the blood-pressure varies, showing that the effect is chiefly manifested on the heart and not on the blood vessels (Graph I, fig. A).

Action on the respiratory system.—Intravenous injections of Alepol produce a well marked stimulation of respiration in rabbits, without any anæsthesia. The stimulant action on respiration is also manifested in animals under the influence of anæsthesia. There is an initial slight depression of respiration followed by a well sustained stimulation. The initial depression may be due to the alkaline nature of the injection. There is also a slight dilatation of the bronchioles produced (Graph I, fig. A).

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GRAPH 1.

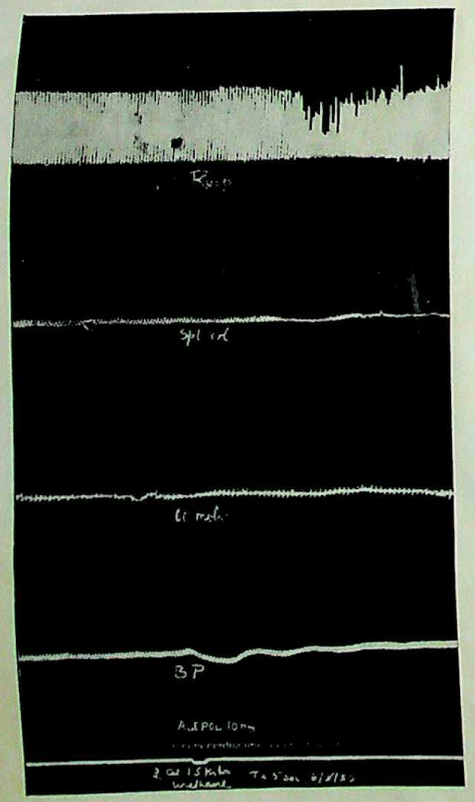


Fig. A.—Shows the records of respiration, spleen volume, uterine movements and blood-pressure from above downwards. Note the slight inhibition followed by stimulation in respiration and a slight fall and recovery in blood-pressure, after a dose of 10 mgs. of Alepol. The other curves are not affected.

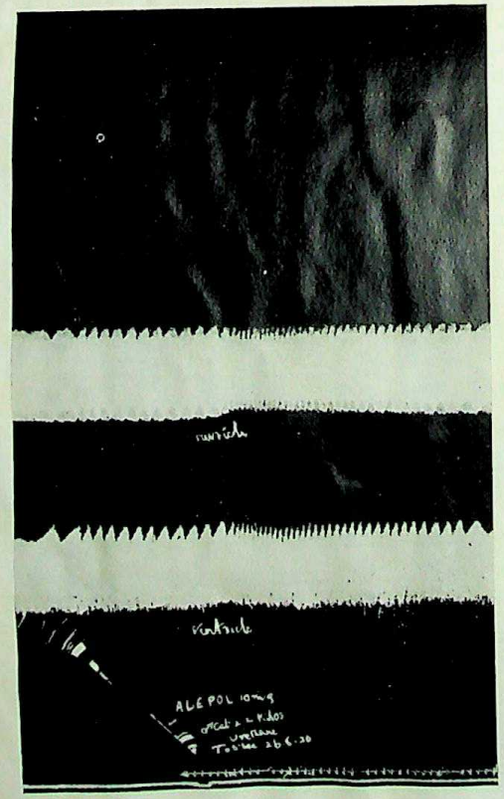
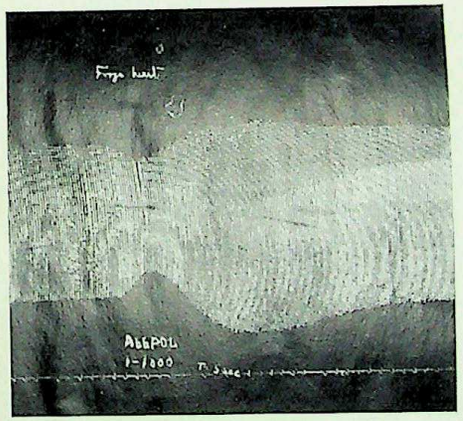


Fig. B.—Shows the tracings of the auricle and the ventricle from above downwards. Note the slight depression of both the auricle and the ventricle produced by 10 mgs. of Alepol.



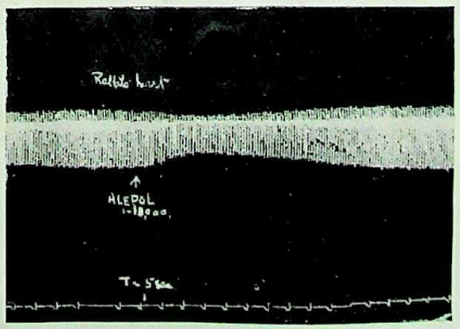
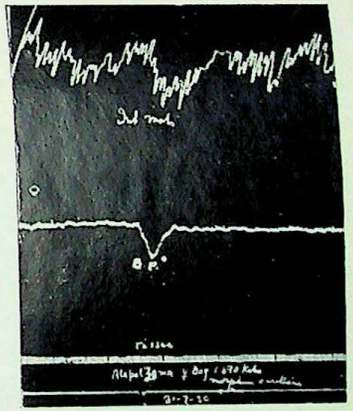


Fig. C.—Shows the effect of Alepol in a perfused amphibian heart. Note the slight depression followed by stimulation.

Fig. D.—Shows the effect of Alepol in a mammalian heart. Note the depression followed by recovery.



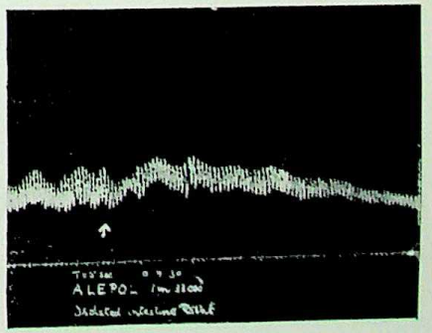


Fig. E.—Shows the effect of 30 mgs. of Alepol on the intestinal movements *in situ* and on the blood-pressure. Note that blood-pressure shows a fall and recovery while the intestinal movements are not affected.

Fig. F.—Shows the action of Alepol on perfused intestines. Note the slight increase in tone followed by a relaxation and inhibition of automatic contractions.

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Action on the gastro-intestinal system.—Oral administration of a 10 per cent. solution in dogs produces vomiting in about 15 minutes. The emesis is local in origin, for very much larger doses are tolerated when the drug is given by hypodermic injections. Continuous administration of small doses of Alepol leads to anorexia and loss of weight in animals, frequently accompanied by vomiting. Experiments *in situ* do not show any marked action of the drug on the movements of the small intestines. The tone as well as the automatic movements of the intestines remain unchanged after administration of 5 to 10 mgs. of Alepol per kilo intravenously (Graph I, fig. E). Perfusion experiments with rabbit's and cat's intestines show a slight stimulation followed by a well-sustained depression (Graph I, fig. F).

Action on the genito-urinary system.—In dogs and cats under anæsthesia, an intravenous injection of Alepol does not affect the flow of urine in any way, the rate of drops of urine remaining the same before and after the injection. Movements of the uterus *in situ* are not affected by Alepol injections in animals under anæsthesia. Perfusion experiments, however, show a slight increase in the tone and the amplitude of contractions of the uterus, in dilutions such as 1 in 10,000. With higher strengths, the tone as well as the movements are lessened.

From the experimental data given above, it will be seen that Alepol is a drug of low toxicity, it is well absorbed when given by injections, and has not got any marked action on the systems of the body except the blood. There is a slight depression of the heart, and the gastro-intestinal system is affected when the drug is given orally. A detailed study of the pharmacological action will be considered in a separate paper.

Clinical.

The following is a brief summary of cases treated in the King George's Hospital during the last seven months:—

Case 1.—K., Hindu male, age 17 years, student.

Lesions.—Anæsthetic depigmented patches on the back and right thigh. Atrophy of the right hypothenar muscles, duration 4 years.

Treatment.—Alepol, beginning with 1 c.c. intramuscularly, rising gradually to 5 c.c.

Remarks.—Patient took treatment for 6 months and then left the hospital. Sensation in the patches returned after about three months' treatment, and the skin also was showing signs of regaining normal pigment. Atrophy of the muscles unaffected.

Case 2.—M. B., Hindu male, age 35 years, police constable.

Lesions.—An anæsthetic patch on the left lower jaw near the angle. Skin in the area thick, raised, duration 1 year.

Treatment.—Alepol 1 c.c., rising to 5 c.cs. Had some injections of hydnocarpus oil for about two months before the Alepol treatment was begun. Trichloracetic acid locally.

Remarks.—The patient is under treatment for the last eight months. Condition of the skin much improved, anæsthesia disappearing, normal pigment returning. Patient is still continuing the treatment.

Case 3.—A. H. K., Mahomedan male, age 18, student.

Lesions.—Anæsthetic depigmented patches all over the body, duration 2 years.

Treatment.—Alepol 1 c.c., rising to 5 c.cs.

Remarks.—A rapid return of sensations after a treatment of two and a half months only.

Case 4.—P. R., Hindu male, age 45, teacher.

Lesions.—Anæsthetic patches on the front of the abdomen, on the waist, a patch on the cheek, etc.

Treatment.—Alepol 1 c.c., rising to 5 c.cs. Locally trichloracetic acid on some lesions.

Remarks.—After the second injection the lesions became worse and the patient discontinued treatment for some days. Treatment resumed after about two weeks. This time there was no untoward effect and the patient is continuing treatment since then. All the lesions are improving.

Case 5.—L. P., Hindu male, age 40, teacher.

Lesions.—Depigmented anæsthetic patch in the left axilla. Complete loss of sensation on the ulnar side of the left forearm. Patches on the outer side of right foot, etc. Erythematous lesions in the mid-scapular region.

Treatment.—Alepol 1 c.c., rising to 5 c.cs.

Remarks.—The patch in the axilla showed a good improvement after only four weeks' treatment. The erythematous lesions disappeared during that time. Other lesions on the body showed no improvement at all.

Case 6.—P., Hindu female, age 48.

Lesions.—Anæsthetic depigmented patches in the right scapular region and distributed all over the back. Lesions also on the legs, foot, etc.

Treatment.—Alepol 1 c.c., rising to 5 c.cs. Trichloracetic acid externally.

Remarks.—The lesions were red and erythematous on admission. Only a couple of injections brought about a very remarkable change in the condition of the skin. After this the progress was slow. Sensation has returned in some lesions only.

Case 7.—N. R., Hindu male, age 20, painter.

Lesions.—Typical "B 3" lesions.

Treatment.—Alepol 1 c.c., rising to 5 c.cs. Had injections of pure hydnocarpus oil before.

Remarks.—The patient is under Alepol treatment for the last 4 months: shows absolutely no change in his condition.

Case 8.—B. P., Hindu male, age 35, school teacher.

Lesions.—Skin lesions "B 2" type on the nose.

Treatment.—Alepol 1 c.c. to 5 c.cs.

Remarks.—No change in the condition after 4 months' treatment. Left the hospital without any improvement.

Case 9.—S., Hindu male, age 18.

Lesions.—Trophic lesions in right hypothenar and interossei muscles. Anæsthesia on the ulnar side of the left hand.

Treatment.—Alepol 1 c.c. to 5 c.cs.

Remarks.—No improvement after 4 months' treatment.

Discussion.

The cases reported above show that in some cases we get very good results with Alepol treatment, while in others there is not the slightest improvement seen. We are at present treating about 40 cases of all types of leprosy with Alepol. We have on record some more cases which show a definite improvement and others which show none. The few cases reported above, however, give an idea of the type in which Alepol is most successful. In Cases 1 to 6 all the patients showed improvement. The improvement, however, is seen only in the A 1 lesions. Cases 7 to 9 show that in B lesions and A 2 lesions the effect of Alepol

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is not manifested. It must, however, be emphasised here that we are treating the cases for the last six months only, and therefore our observations have only a limited value. It is the common experience of all that the lesions which respond well and in the shortest time are the A 1 lesions. A trial for continued periods only will demonstrate the value of Alepol in lesions other than A 1. Case 6 gives an illustration of how administration of a drug in the acute periods may give a false idea of the value of the drug. It is clear that this patient got over the acute symptoms by natural processes alone, while at the same time she happened to receive the Alepol injections. It may appear from the case report that the change was due to the injections she received; this was not the case. The improvement shown by the drug was manifested slowly and the return of sensation after about six months' treatment was due to the drug. Similarly in Case 5 the rapid disappearance of the erythematous lesions must have been due to the natural amelioration of the acute condition. These cases illustrate the fallacies which one must guard against while treating cases with new remedies, and which are pointed out by Muir to be the causes of the reputation of a number of drugs as specifics in leprosy.

Summary and conclusions.

(1) Alepol is a drug of fairly low toxicity, and it is rapidly absorbed when given by hypodermic or intramuscular injections.

(2) It has an irritant action on the mucous membranes, but can be tolerated in 3 per cent. strength when given into the muscles or under the skin without producing any marked irritant action. Three per cent. strengths intramuscularly are borne by patients without any discomfort.

(3) It has got marked hæmolytic properties.

(4) It causes a fall in blood-pressure in animals when given intravenously; this is due chiefly to its action on the heart.

(5) When administered orally it produces vomiting, due to the irritant action on the gastric mucous membrane.

(6) It has not got any marked action on other systems of the body.

(7) A report of cases treated with Alepol is given.

Our thanks are due to Dr. V. R. Natesa Mudaliar and Dr. C. Seetarama Raju for their active help in our clinical work.

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NOTE ON THE DETERMINATION OF THE NITROGEN IN SOUR MILK AS A SUBSIDIARY STANDARD OF PURITY.

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THE analysis of sour milk in order to determine the common standard, i.e., specific gravity, the percentage of fat, and total solids not fat, is difficult and tedious and the results obtained are uncertain. The nitrogen figure as representing the protein content is not usually affected by souring and it has been suggested that the percentage of nitrogen should be used as a subsidiary standard in examining sour milk for purity. Hawley (1918) in his report on the Madras Food Adulteration Act suggests a standard of 0.5 per cent. nitrogen as a minimum standard in estimating purity of milk or sophistication by addition of water. The following examinations have been carried out in the Bengal Public Health Laboratory in order to see how far this suggestion would apply to Bengal milk and Bengal Food Adulteration Act's standards. The standards for milk in the Bengal Adulteration Act are:—Specific gravity: —1028–1030 at 15.5°C. Fat:—cow's milk minimum 3.5 per cent., buffalo 6 per cent., mixed milk 5 per cent. minimum. Solids not fat:—Cow's milk minimum 8.5, buffalo 9 per cent., mixed milk 9 per cent. The following table gives the results. Numbers 1 to 8*a* are genuine milks, numbers 9, 10, 11 and 12 are adulterated milks. The samples were examined at intervals varying from four days to one week. From analysis it will be seen that the percentage of lactose rapidly diminishes with souring and in most instances at least 75 per cent. disappears. The percentage of nitrogen varies from 0.56 maximum to 0.46 minimum. It will be seen that there is very little diminution in the percentage of nitrogen present during the process of complete souring. In the genuine milks, the results are in agreement with those given in Madras. 0.5 per cent. would appear to be a suitable minimum standard, and deviation of 0.05 per cent. from this is not much beyond the limitations of experimental error. It has been stated that the process of souring usually stops when the percentage of lactose falls by 50 per cent. This would not appear to be true under conditions in Calcutta. In the adulterated samples the adulteration is shown by ordinary analysis and is confirmed by the nitrogen percentage. In sample number 8*a* the analysis was stopped with the appearance of a pink colour due to growth of an organism resembling *Bacillus prodigiosus* (Richmond, 1914). Sample number 8 was inoculated with cultures of this growth and considerable

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TABLE.

No.	Date of analysis.	Description of samples.	Total nitrogen by Kjeldahl method.	Acidity as lactic acid.	Lactose remaining.	Specific gravity at 15°C.	Fat.	Ash.	Total solid.
1	1-12-27	Buffalo milk—genuine.	0.562	..	4.6	1,033.0	6.6	0.78	16.1
	5-12-27	After souring ..	0.56	1.2	4.06	..	..	..	..
	16-12-27	Do. ..	0.541	1.6	2.13	..	..	..	..
	18-1-28	Do. ..	0.546	1.75	Trace	..	..	..	..
2	31-1-28	Milk sent from Fulwari dairy farm, it is on the point of decomposition, fat globules are found to be separated.	0.47	0.97	4.52	1,030.5	5.65	0.74	14.88
	6-2-28	After souring ..	0.467	1.14	3.33	..	..	..	..
	10-2-28	Do. ..	0.467	1.64	2.72	..	..	..	..
	14-2-28	Do. ..	0.467	1.96	2.81	..	..	..	..
	17-2-28	Do. ..	0.47	2.1	2.6	..	..	..	..
	22-2-28	Do. ..	0.484	2.23	2.53	..	..	..	..
	27-2-28	Do. ..	0.484	2.3	2.43	..	..	..	..
	5-3-28	Do. ..	0.49	2.65	1.57	..	..	..	..
	12-3-28	Do. ..	0.49	3.1	1.0	..	..	..	..
3	15-2-28	Buffalo milk—genuine.	0.487	0.011	4.71	1,031.5	6.95	0.74	16.43
	21-2-28	After souring ..	0.467	1.25	3.75	..	..	..	..
	24-2-28	Do. ..	0.46	1.71	3.45	..	..	..	..
	28-2-28	Do. ..	0.464	2.3	2.88	..	..	..	..
	5-3-28	Do. ..	0.476	2.83	1.74	..	..	..	..
	9-3-28	Do. ..	0.46	3.17	1.21	..	..	..	..
	15-3-28	Do. ..	0.46	3.25	1.1	..	..	..	..
4	24-2-28	Buffalo milk—genuine.	0.54	0.014	4.7	1,029.0	9.9	0.7	19.32
	29-2-28	After souring ..	0.538	1.23	3.22	..	..	..	..
	8-3-28	Do. ..	0.538	3.097	1.99	..	..	..	..
	13-3-28	Do. ..	0.538	3.97	1.04	..	..	..	..
	19-3-28	Do. ..	0.538	4.4	0.94	..	..	..	..
5	12-6-28	Bazar milk ..	0.5	0.18	4.11	1,031.5	5.0	0.75	14.94
	18-6-28	After souring ..	0.495	2.1	2.88	..	..	..	..
	25-6-28	Do. ..	0.49	2.18	2.12	..	..	..	..
	4-7-28	Do. ..	0.495	2.24	1.54	..	..	..	..
	12-7-28	Do. ..	0.5	2.34	1.43	..	..	..	..
	18-7-28	Do. ..	0.495	2.4	1.35	..	..	..	..
6	11-1-27	Cow milk—genuine.	0.523	..	5.16	1,032.0	4.3	0.72	13.53
	13-1-27	After souring ..	0.487	..	..	..	..	..	..
	15-1-27	Do. ..	0.482	..	..	..	..	..	..
	17-1-27	Do. ..	0.482	..	..	..	..	..	..
	21-1-27	Do. ..	0.481	..	..	..	..	..	..
	1-2-27	Do. ..	0.5	..	..	..	..	..	..
7	13-1-29	Buffalo milk—genuine.	0.52	0.144	4.08	1,030.0	7.1	0.72	16.0
	21-1-29	After souring ..	0.52	1.098	2.51	..	..	..	..
	29-1-29	Do. ..	0.5	2.75	1.47	..	..	..	..
	5-2-29	Do. ..	0.51	3.37	0.85	..	..	..	..
8	15-5-29	Cow milk ..	0.533	0.126	4.55	1,030.5	5.1	0.7	14.42
	22-5-29	After souring ..	0.52 *	1.0	3.39	..	..	..	..
	31-5-29	Do. ..	0.523 0.36 † 0.523	2.43	1.35	..	..	..	..

* 5 grams of original milk separately kept and total nitrogen estimated.

† 5 grams of original milk inoculated with *Bacillus prodigiosus* kept in a sterile flask until sour.

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TABLE—*contd.*

No.	Date of analysis.	Description of samples.	Total nitrogen by Kjeldahl method.	Acidity as lactic acid.	Lactose remaining.	Specific gravity at 15°C.	Fat.	Ash.	Total solid.	
8a	1-2-29	Samples of milk as supplied to Tropical School.	0.495	0.153	4.46	..	..	..	..	
	11-2-29	After souring ..	0.481	1.09	2.95	..	..	..	..	
	21-2-29	Do. ..	0.49	2.08	1.09	..	..	..	..	
9	16-4-29	Sample of bazar milk sold as cow milk.	0.21	..	2.13	1,018.5	2.0	0.3	8.44	Discarded owing to the growth of pink colour in it.
	23-4-29	After souring ..	0.207	1.4	1.37	..	..	..	..	
	30-4-29	Do. ..	0.204	1.58	0.47	..	..	..	..	
	9-5-29	Do. ..	0.21	1.8	0.45	..	..	..	..	
	15-5-29	Do. ..	0.2	1.85	0.43	..	..	..	..	
10	5-6-28	Bazar milk ..	0.27	0.08	2.6	1,023.0	3.6	0.412	10.05	
	14-6-28	After souring ..	0.26	1.47	1.61	..	..	..	..	
	21-6-28	Do. ..	0.255	1.92	1.16	..	..	..	..	
	3-7-28	Do. ..	0.27	2.25	0.625	..	..	..	..	
	10-7-28	Do. ..	0.269	2.26	0.3	..	..	..	..	
11	8-2-29	Sample of milk supplied from Medical College.	0.37	0.126	3.8	1,026.0	3.5	0.6	11.37	
	18-2-29	After souring ..	0.367	2.19	1.93	..	..	..	..	
	22-2-29	Do. ..	0.364	2.41	0.78	..	..	..	..	
	8-3-29	Do. ..	0.375	2.87	Trace	..	..	..	..	
12	3-2-27	Cow milk ..	0.36	..	4.05	1,024.0	3.3	0.54	10.18	
	9-2-27	Do. ..	0.369	..	5.4	1,031.0	3.3	0.68	11.74	
	11-2-27	After souring ..	0.364	0.8	..	..	..	..	..	
	15-2-27	Do. ..	0.364	0.88	..	..	..	..	..	
	18-2-27	Do. ..	0.364	1.0	..	..	..	..	..	
1	16-5-29	Goat's milk—genuine.	0.62	0.135	4.0	1,030.0	5.8	0.748	14.64	The sample bottle kept always at 15°C.
	23-5-29	After souring ..	0.6	1.33	3.08	..	..	..	..	
	5-6-29	Do. ..	0.6	2.7	0.82	..	..	..	..	
2	30-5-29	Goat's milk ..	0.61	0.135	4.13	1,031.0	3.8	0.74	12.55	
	7-5-29	After souring ..	0.58	1.49	1.9	..	..	..	..	
	11-6-29	After souring, made sour after adding to it some culture of *Bacillus prodigiosus.*	0.579	1.67	3.8	..	..	..	..	
	20-6-29	Do. ..	0.584	1.71	3.8	..	..	..	..	

diminution in nitrogen occurred owing to proteolytic action.

Conclusion.—The suggestion that the protein figure should be used as a subsidiary standard in the analysis of sour milk is confirmed and the percentage of nitrogen in genuine milks found in Madras is in agreement with those found in Calcutta milk.

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A MALARIA SURVEY IN NOAKHALI DISTRICT, BENGAL.*

By SARASI LAL SARKAR, M.A., L.M.S.,
Late Civil Surgeon, Noakhali.

A MALARIA survey of certain parts of the district of Noakhali was carried out during February and March 1930, the area surveyed including part of the town of Noakhali, Feni subdivision, Sandwip Island, and Hatia Island at the head of the Bay of Bengal.

Noakhali Town.

The town of Noakhali derives its name from a watercourse called the *noa-khali* or "new channel," and is very healthy as regards malaria. Examination of children gave a spleen rate of nil, whilst the only three species of adult anophelines captured were *A. aconitus, barbirostris,* and *fuliginosus.* Malaria may be considered negligible in Noakhali town.

Feni Subdivision.

This lies between latitudes 22° 43′ and 23° 18′ N., and 91° 15′ and 91° 35′ E., and has an area of 343 square miles. It consists of low-lying alluvium, with the exception

* This paper was re-arranged by the Editor who cannot accept responsibility for the correctness of the figures.

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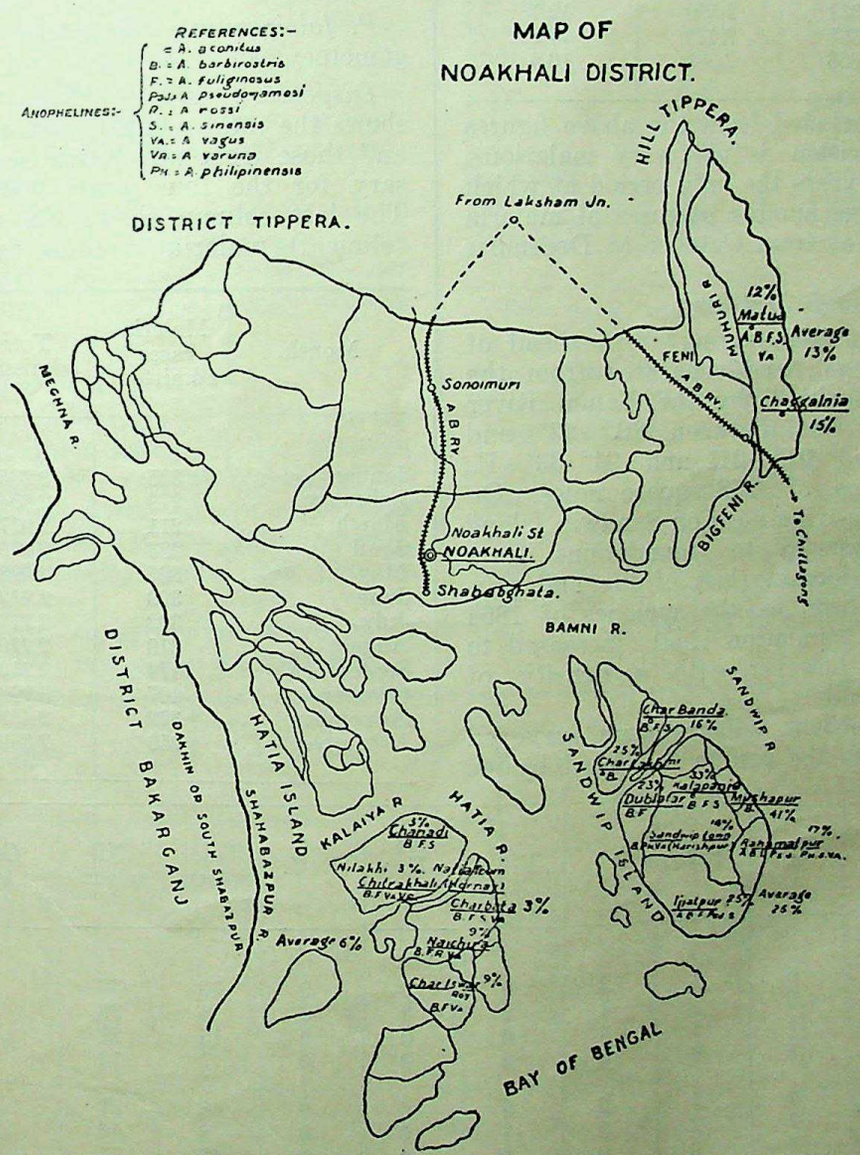
of a strip of land adjoining Hill Tippera where the country is more undulating. The villages of Matua, Chhagalnaia East, and Chhagalnaia West were surveyed with the following results. The spleen indices were as shown on the map.

Spleen rates.

Villages.	F 1.	F 2.	F 3.	F 4.	U.	B. U.	Total spleen.	Nil spleen.	Grand total.	Splenic index.
										Per cent.
1. Matua ..	2	1	0	0	0	0	3	23	26	11.5
2. Chhagalnaia, East and West.	0	1	1	0	0	0	2	11	13	15.3
TOTAL AND AVERAGE.	2	2	1	0	0	0	5	34	39	12.8



Mosquitoes.—Five species of anopheline larvæ were encountered, viz., *A. aconitus*, *barbirostris*, *fuliginosus*, *sinensis*, and *vagus*; also the adults of *A. barbirostris* and *A. fuliginosus*. Of these *A. aconitus* and *A. fuliginosus* are proved malaria carriers.

Parasites.—Fifteen blood films—both thick and thin—were taken from children with enlarged spleen and pyrexia, but in only one slide were parasites found, viz., gametocytes of *P. falciparum*.

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Dispensary returns.—The following statement shows month by month the total number of cases of (*a*) malaria, and (*b*) all admissions to the Chhagalnaia Dispensary during the four years 1926–1929 inclusive; the last column of the table shows the ratio of (clinical) cases of malaria to the total number of all cases admitted in each month.

Month.	Malaria cases admitted.	Total admissions.	Ratio; malaria to total admissions.
			Per cent.
January ..	284	2,941	9.7
February ..	178	2,392	7.4
March ..	272	2,821	9.6
April ..	415	3,768	11.0
May ..	456	3,401	13.4
June ..	320	3,024	10.6
July ..	346	3,050	11.3
August ..	379	2,580	14.7
September ..	291	2,600	11.2
October ..	323	2,550	12.7
November ..	367	2,419	15.2
December ..	388	2,339	16.6

It may be concluded from the above figures that Feni subdivision is not very malarious. During the four years the only period at which an unusually large number of cases of malaria were admitted was from October to December 1927.

Sandwip Island.

This is a large island lying at the head of the Bay of Bengal, and separated from the mainland and Noakhali by the Bamni River or channel. It lies between 22° 23′ and 22° 37′ N. and 91° 21′ and 91° 33′ E., and has an area of 258 square miles. On account of its low-lying position Sandwip Island is peculiarly exposed to inundations from storms, and considerable loss of life and property occurred here in the cyclones of 1864 and 1876. The population had increased to 72,467 by 1881, however, with a density of 446 per square mile.

Spleen rates.—Eight villages were surveyed in the island with the results tabulated below.

These villages were investigated as they probably constitute the most malarious part of the island, but even here the malaria incidence is quite low, only the villages of Musapur and Kalapania giving spleen rates exceeding 25 per cent.

Mosquitoes.—Larvæ of six anopheline species were encountered; viz., *A. aconitus, barbirostris, fuliginosus, philippinensis, pseudo-jamesi,* and *sinensis;* and adults of five species, viz., *A. aconitus, fuliginosus, philippinensis, barbirostris,* and *vagus.* Of these *A. aconitus, fuliginosus,* and *philippinensis* are proved malaria carriers.

Parasites.—Fifty-six blood films were taken, and of these 13 or 23 per cent. were positive. The findings were as follows:—

P. vivax.—Five positives; 1 showed gametocytes.

P. malariæ.—Two positive. No gametocytes seen.

P. falciparum.—Six positive. Three showed gametocytes.

Dispensary returns.—The following table shows the total monthly admissions for malaria and those from all causes to Sandwip Dispensary for the four years 1926–1929 inclusive. The last column shows the ratio of cases of (clinical) malaria to total admissions.

Month.	Malaria cases admitted.	Total admissions.	Ratio; malaria to total admissions.
			Per cent.
January ..	325	3,235	10.0
February ..	279	2,854	9.8
March ..	211	2,917	7.2
April ..	283	2,975	9.5
May ..	306	3,098	9.9
June ..	309	2,912	10.6
July ..	302	2,710	10.8
August ..	219	2,220	9.9
September ..	174	2,210	7.9
October ..	407	3,072	13.2
November ..	322	2,458	12.3
December ..	250	2,330	10.7

Villages.	F 1.	F 2.	F 3.	F 4.	U.	B U.	Total spleen.	Nil spleen.	Grand total.	Splenic index.
										Per cent.
1. Ijjatpur ..	5	3	2	0	0	0	10	30	40	25.0
2. Rahamatpur	2	1	1	2	0	0	6	29	35	16.6
3. Musapur ..	11	1	3	0	0	0	15	21	36	41.3
4. Sandwip town (Harishpur).	2	0	0	0	0	0	2	12	14	14.2
5. Dublafar ..	4	2	2	0	0	0	8	27	35	22.8
6. Kalapania ..	2	2	3	1	0	0	8	16	24	33.3
7. Char-Lakhmi	7	9	0	0	0	0	18	53	71	25.3
8. Char-Bandu	1	3	0	0	0	0	4	21	25	16.0
TOTAL AVERAGE ..	34	21	12	4	0	0	71	209	280	25.3

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The following table shows the total monthly admissions for malaria, and those from all causes to Charbandu Dispensary for the four years 1926–1929 inclusive. This dispensary is situated in the north of the island.

Month.	Malaria cases admitted.	Total admissions.	Ratio; malaria to total admissions.
			Per cent.
January ..	291	2,613	11.1
February ..	172	2,163	7.9
March ..	121	3,199	3.8
April ..	174	2,918	6.0
May ..	192	3,064	6.3
June ..	167	2,515	6.6
July ..	234	2,267	10.3
August ..	260	2,050	12.7
September ..	206	2,336	8.8
October ..	480	2,897	16.5
November ..	707	2,532	27.9
December ..	417	2,249	18.5

In the above table very high malaria incidence is recorded in the months of October to December 1927; in fact that autumn appears to have seen what were almost epidemic conditions established.

The above figures show that Sandwip Island is the most malarious of the four areas surveyed, with an average spleen rate of 25 per cent. Even this figure, however, hardly denotes severe endemicity.

Hatia Island.

This lies west of Sandwip Island, in the estuary of the Meghna River; it lies between 22° 25′ and 22° 42′ N., and 90° 53′ and 91° 9′ E., and has an area of 185 square miles, and a population of 55,390 (in the 1901 census), the density of population being 299 persons per square mile.

Spleen rates.—Six villages were surveyed in the island, with the following findings:—

Villages.	F 1.	F 2.	F 3.	F 4.	U.	B U.	Total spleen.	Nil spleen.	Grand total.	Splenic index.
1. Char-Bata ..	2	2	1	0	0	0	5	69	74	6.7
2. Hatia town (Horney).										
3. Chitrakhali ..	1	1	0	0	0	0	2	67	71	2.8
4. Chanandi ..	1	0	0	0	0	0	1	37	38	2.8
5. Nalchira ..	0	1	4	0	0	0	5	56	61	8.5
6. Char-Iswar Ray.	4	0	1	0	0	0	5	49	54	9.2
TOTAL AND AVERAGE.	8	4	6	0	0	0	18	280	298	6.04

Mosquitoes.—Five species of anopheline larvæ were caught in this island, viz., *A. barbirostris, fuliginosus, rossi* (*subpictus*), *sinensis*, and *vagus;* and the adults of four species, viz., *A. barbirostris, fuliginosus, vagus* and *varuna.* Of these, *A. fuliginosus* and *A. varuna* are proved malaria carriers.

Parasites.—Twenty blood films were taken on this island, but only three of them (15 per cent.) proved positive, viz.:—

P. malariæ.—One positive; all forms including gametocytes.

P. falciparum.—Two positives. Rings only.

Dispensary returns.—The following table shows the total monthly admissions for malaria and those from all causes for the four years 1926–1929 inclusive to Hatia Dispensary:—

Month.	Malaria cases admitted.	Total admissions.	Ratio; malaria to total admissions.
			Per cent.
January ..	512	3,296	15.5
February ..	311	2,902	10.7
March ..	310	3,528	8.8
April ..	283	3,301	8.6
May ..	275	3,383	8.1
June ..	275	3,284	8.4
July ..	260	3,221	8.1
August ..	280	2,680	10.4
September ..	441	2,913	15.1
October ..	986	3,470	28.4
November ..	1,058	3,492	30.3
December ..	589	2,695	21.9

The very high ratios shown in the autumn in the above table are due to an excessive number of admissions for fever in October to December 1927, when upwards of 600 to 700 cases were admitted monthly.

From the above figures we may conclude that Hatia Island is but little malarious; the highest spleen rate—9 per cent.—is not an unhealthy one for a rural area. In common with most of the district, however, the island may become subject to epidemic conditions.

* * * * *

Discussion.

Everywhere the anopheline larvæ were caught in either tanks or *khals*, etc., and the

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adults in cowsheds or sleeping rooms. One peculiar feature that the survey has brought out is the abundant prevalence everywhere of *A. barbirostris*, which was encountered both on the mainland and in the islands. A special search was made for *A. ludlowi*, but this species was nowhere encountered. Throughout the district, tanks form a prominent feature of the scenery. These are of two types; the small and very numerous ones encountered in every village are the result of digging out earth in a low-lying country in order to raise the houses above flood level, and the larger tanks which owe their existence to the benevolence of landholders and zemindars. There are no good wells in the area, and as the rivers which are tidal have brackish or saline water, the people have to depend on these tanks for their water supply.

It may be concluded that malaria is not endemic in these areas, but that it may become epidemic in them occasionally. Sandwip Island is the most malarious of the four zones; here the country is low-lying and protected from the tides by embankments alongside every watercourse to prevent the entry of the brackish water brought by the tides, which is destructive to the agricultural crops. This procedure of protecting the land from the tide does considerable harm in creating suitable breeding places for the carrier anophelines, which would otherwise be swept out by the natural tides.

In all, nine species of anopheles were encountered, viz., *A. aconitus, fuliginosus, philippinensis, pseudo-jamesi* (*ramsayi*), *barbirostris, rossi* (*subpictus*), *sinensis* (*hyrcanus*), *vagus*, and *varuna*. Of these *A. aconitus, fuliginosus, philippinensis*, and *varuna* are proved malaria carriers. In tanks and *dobas* larvæ of *A. aconitus, barbirostris, sinensis, fuliginosus, philippinensis*, and *pseudo-jamesi* were found; whilst in the *khals*, which are not tidal, larvæ of *A. aconitus, sinensis, fuliginosus, philippinensis*, and *vagus* were collected.

The universal presence of *A. barbirostris* is of interest. This may be associated with the fact that the edges of the tanks and collections of water throughout the area are generally free from weeds but covered with a small variety of grass, not found elsewhere on the edges of tanks in Bengal. The edges of the tanks also are generally firm to the tread and not soft. When the rains dry up there is left a considerable wide margin of hard, firm earth at the edge of the tank, and but little or no mud. No larvæ of *A. barbirostris* were found in the *khals*, although *A. vagus* breeds freely in them.

In a personal communication, Dr. C. A. Bentley, recently Director of Public Health, Bengal, suggested that the reason why Sandwip Island is so much more malarious than Hatia Island might be that the former is more intensively cultivated and heavily embanked. The density of the population is markedly greater in Sandwip Island, and the innumerable embankments favour the creation of suitable breeding sites for the carrier anophelines. Further, there appear to be more buffaloes on Hatia Island, which may have an effect in reducing the amount of malaria there in man. In connection with the difference between the two islands, it is interesting to note that *A. philippinensis*—a proved carrier—is present in Sandwip Island, but absent from Hatia Island.

In general, the district of Noakhali is relatively free from malaria. Of the carrying species present, *A. fuliginosus* is universally present, but it is known to be a poor carrier, with a low sporozoite rate. The people are in general prosperous, and agriculture at a fairly high level. Also cattle are abundant, and may to some extent deflect the carrying species from biting man. *A. fuliginosus* is stated to be a zoophilous rather than an androphilous mosquito, and this again may lower the malaria incidence. Except in very occasional years when localised epidemics of malaria of short duration may set in, malaria does not appear to be a severe problem in Noakhali District.

In conclusion, I have to thank the officers of the Malaria Department of the Public Health Department of the Government of Bengal for the statistics and information collected in this article, and Dr. C. A. Bentley, C.I.E., recently Director of Public Health, Bengal, for permission to publish it.

A Mirror of Hospital Practice.

A SOMEWHAT UNUSUAL CASE OF ALGID MALARIA.

By D. R. DHAR, M.B., D.T.M. (Cal.), M.R.C.P. (Lond.),
69B, Simla Street, Calcutta.

AT noon on 16th October, 1930, I was telephoned up to see a case, suspected to be one of food-poisoning, in Hotel Dieu (Harrison Road). On arrival, I found the patient, a Brahmin student of about 18 years with a fair physical development, lying in bed in a semi-conscious state.

History.—At about 9 a.m. that morning the patient complained of a sharp pain in his stomach region. He could not locate the exact site of the pain—but it seemed that it was more marked on the left than on the right side of the abdomen, though he could not describe the character and type of it. He had had a number of liquid motions and had also vomited several times. In my presence he passed one liquid bile-stained motion and vomited once. There were the remains of a fading rash of an urticarial type around the umbilicus. I was told that he had had a severe urticarial rash. The doctor attending told me that the patient had taken some bazar-made ice-cream (*kulpi borof*) from a hawker and had also taken some crabs (*kakra*) two days previously; he suspected the case to be one of food-poisoning.

Physical examination.—On inspection the patient was somewhat pinched and definitely cyanosed. Palpation

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revealed that he was pulseless at the wrist; his extremities up to the elbows and the knees were cold. The anterior two-thirds of his tongue was so much cyanosed that it stood out in clear contrast to the normal looking hind part; it was dry too. The finger tips and the lips also shared a marked degree of cyanosis.

Neither liver nor spleen was palpable or tender. There was nothing abnormal in any of the organs. The heart was beating at the rate of 100 per minute.

Symptoms.—Intense thirst, fluid purging and vomiting, both the latter were bile-tinged.

The axillary temperature was below 97°F. The oral temperature was not taken as the patient was almost constantly drinking cold or iced water. The pupils were feebly reacting.

On repeated enquiry as to whether the patient had been recently in a malarious place, one was given to understand that he had been born and bred in a non-malarious place in Behar and had never frequented any malarious locality.

Diagnosis.—There was much difficulty in coming to a proper diagnosis. Cholera was unlikely because of the bile-tinged excreta, the patient was not sufficiently dehydrated in appearance, and the symptom-complex, namely, cramps and burning sensation of the body had not developed; there was no anuria. Though the clinical signs were against cholera yet arrangements were made for taking the specific gravity of the blood. Urine was taken for examination for leucin and tyrosin crystals in the fear that it might be a case of acute yellow atrophy of the liver.

Treatment.—An alkaline mixture was already prescribed; I added a powder containing fractional doses of calomel, chloretone, menthol, and sodium bicarbonate to prevent vomiting. An injection of atropin, 1/100 gr. and adrenalin chloride 0.5 c.c., both together, was given. Within fifteen minutes after the injection the patient complained of chill and shivering and wanted blankets. The extremities got warmer and the radial pulse appeared and gradually improved. The axillary temperature was 100°F. We now took two blood films and injected intravenously 5 grains of quinine bihydrochloride in 20 c.cms. of 25 per cent. glucose solution, 2 c.cms. of 5 per cent. calcium chloride and strophanthin 1/500 grain in solution. We took five minutes to inject 22.5 c.cms. of solution, one doctor feeling the pulse all the while and indicating the time by looking at a watch during the whole period of the injection.

Alkaline waters were given freely by the mouth. The calomel in divided doses was also continued.

The films showed on staining numerous malignant tertian rings.

In the evening we were agreeably surprised to find the spleen enlarged to about one inch below the costal margin. Then quinine was continued by the mouth. The patient developed a slight icteroid tinge in the conjunctivæ next morning, a fairly common symptom in all cases of heavy malignant tertian infection. The patient's father, who came the next morning, gave me to understand that his son had been to a very malarious place during the Pujahs which took place a few weeks before this attack. He made an uninterrupted recovery.

The interest in this case lies in the facts that urticaria at the onset of algid malaria is rather uncommon. Usually there is a history of a few hours, if not of a few days, fever before the patient passes into the algid state, but here from the onset the patient was in the algid state. The misleading history that the patient was never in a malarious place is also another interesting feature of this case. Generally in cases of algid malaria one encounters either an icteroid tinge of the conjunctivæ or, though rarely, a palpable spleen, but both were absent in this case.

The supervention of cholera- or food-poisoning-like symptoms with urticaria and collapse from the very onset of malignant tertian infection is neither commonly met with nor are they very well described in textbooks.

ROUND WORM INFECTION SIMULATING ACUTE PERITONITIS.

By K. C. BANERJEE, M.B.,
Medical Officer, Reliance Jute Mills, Bhatpara, 24-Parganas.

N., MOHAMMEDAN MALE, aged 30 years, reported sick in the cooly lines at about 5-30 p.m.

The history was that he had had no motion for three days; there was intense pain in the abdomen with bilious vomiting which started only that morning.

On examination it was found that there was pain in general over the abdomen, aggravated by the slightest pressure, but most acute in the left iliac fossa, rigidity of muscles with limited movements and tympanites—though not much—were present. The pulse was small and 120 per minute, temperature 100.2°F.; tongue coated but moist. The patient had an anxious look with cold sweats on the forehead.

Previous history.—He could only give a history of slight mucus in stools with frequent looseness (which he called a "dysenteric tendency").

The case was puzzling since the symptoms were difficult to account for.

He was advised to go to hospital. Meanwhile he was given the following prescription to be taken every half hour:—

℞	Calomel	gr. ¼
	Extract cannabis indica	„ 1/6
	Menthol	„ 1/6
	Sodium bicarbonate	grs. 5

All food was stopped and he was propped up by raising the head-end of the "charpoy" and with pillows.

Although his bowels were moved during the night, the physical features did not show any sign of improvement. The nausea and vomiting became aggravated towards dawn, but he brought up about 5 to 6 round worms when seen at 8-30 a.m. He was given santonin (grs. 3) and calomel (grs. 2) followed by a saline purge on the day following and the treatment was repeated next day.

Rapid improvement was manifest under this treatment and he resumed work within a week.

"AOLAN" TREATMENT IN CORNEAL ULCER AND CORNEAL OPACITY.

By D. N. PANDYA, L.M.P.,
Benares.

Case 1.—H. S., a Hindu male child of 11 years, while playing in the field was struck by a pebble in the eye. The result was a corneal ulcer and inflammation. The boy was brought to me by his father after he had been under several forms of treatment without any effect. He was given 10 injections of 5 c.c. each of Aolan twice a week. By the time the 10 injections were finished the boy was completely cured.

Case 2.—A., a Hindu female child of 12 years, had suffered from trachoma for a long time and the consequence was a corneal ulcer and marked corneal opacity covering the whole of the cornea. She was brought to me after she had been under several forms of treatment for about 9 months. She was given 10 injections of 5 c.c. each and 5 injections of 100 c.c. each of Aolan twice a week. She is now completely cured and the cornea is quite clear.

Case 3.—A lady of about 55 years had a corneal ulcer at the outer sclero-corneal junction; there was much headache and pain. She came to me, as usual, after several attempts at treatment had been made. She was given 5 injections of 5 c.c. each of Aolan. She was completely cured.

Headache and pain were, of course, present in all the cases mentioned but these symptoms disappeared with the first or the second injection.

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Although these cases are not sufficient to justify a general statement, yet they are of sufficient interest to warrant a trial of Aolan in cases of corneal ulcers and corneal opacities. Case 2 was of a long duration; that is why it required a number of injections.

LANDRY'S PARALYSIS IN AN INFANT.

By RASIK BEHARI LAL,
Medical Officer, Palia Dispensary, Dist. Kheri, U. P.

A CHILD aged 2½ years was brought to the out-patients with complaint that he had been unable to stand up for the last six days.

On examination, I found that his right lower extremity was paralysed. His thigh as well as leg muscles were affected. Patellar reflexes and ankle clonus were absent. Atrophy of the muscles was not apparent; the skin was slightly colder than on the opposite side; bowels and bladder worked normally; there was no fever; the child was irritable and restless throughout the examination.

History.—His parents were drunkards and had occasionally given the child alcohol. The father, who accompanied the boy, did not give any history of fever in the near past but on repeated questioning he admitted that before the onset of the paralysis, the boy had a mild pyrexia.

I diagnosed the case as anterior poliomyelitis with residual paralysis of right lower limb.

(*a*) Although no history of actual attack, yet a mild fever was admitted.

(*b*) The lack of atrophy in the paralysed parts was attributed to the short duration, i.e., six days.

(*c*) I took it that the boy was weeping during the examination due to the irritability described during the primary stage.

I advised massage and electric treatment. However, as his father did not appear willing to bear the expense of the latter treatment at Lucknow, I asked him to see me next day, so that I might consult the books with a view to seeing if anything else could be done by way of medical treatment.

Either because they were not satisfied with my suggestion or for further consultation they took the boy to a quack who gave him some purgative to relieve the loaded bowels which he said was the root cause.

Next day the patient was taken to Lucknow probably because the paralysis had increased somewhat and was admitted to hospital, where he remained for three days. It is said that the patient lost consciousness; he was then brought here again. When I saw him this time, it was a very chilly and damp day; the patient was lying in the open but with one *razai* on. He was wearing a thin muslin shirt.

All the four limbs were paralysed with flaccid muscles, with eye-lids open and balls prominent. He was quite unconscious, respiration very slow and calm, pulse 168 per minute, weak and running, bowels not moved for 36 hours, temperature subnormal.

I gave a hypodermic injection of strychnine and digitalin and ordered a powder of calomel gr. ii, and a mixture containing urotropin, sodium bicarbonate, and spiritus ammoniæ aromaticus. I advised warm clothes to be substituted next to the skin, hot water bottles and a little well-burnt charcoal fire to be kept near the bed.

Next morning the child passed one motion, the condition otherwise was said to be the same.

I asked them to bring the patient to hospital so that I could keep a better watch.

The evening report showed that the condition was the same. Fortunately or unfortunately the treatment was changed again in the night and the old quack jumped in again, with the result that the patient got pneumonia, I think owing to frequent exposures.

Next day at 10 a.m. the patient was brought with well-developed pneumonia of both the lungs. Crepitations and râles all over the back and chest, stertorous breathing and face cynosed, pulse absent at the wrist. He expired at 1 p.m. the same day.

I diagnose the case as Landry's paralysis now, for the following reasons:—

(*a*) There was no actual attack of pyrexia, even the mild fever admitted by his father on repeated questioning may have been false.

(*b*) Paralysis began in one lower limb and gradually progressed to all the four, and finally to the respiratory muscles.

(*c*) The paralysed muscles were all flaccid, no particular group of muscles were affected but the whole limb.

(*d*) There was no atrophy.

(*e*) There was no rise of temperature during the disease until pneumonia supervened.

(*f*) Pneumonia was due to repeated exposure during cold, moist weather and ended the scene sooner than the natural course by failure of respiration.

Landry's paralysis is a rare disease and then it usually occurs in adults.

When it does occur in children it is diagnosed mostly as infantile paralysis.

The involvement of respiratory muscles in the former is the chief point in the diagnosis from the latter.

Progress of atrophy from one to all the limbs is another point, although a progressive type of infantile paralysis occurs, but rarely.

EFFECT OF MILK INJECTIONS IN GONORRHŒAL DISEASE OF JOINTS.

By P. B. SIRCIR.
Medical Officer, Manganese and Iron Mines, Keonjhar and Singhbhum.

I HAD a patient, Mohamedan by caste, aged about 22 years, suffering from acute gonorrhœa for about a month. I placed him under the usual treatment for gonorrhœa. The acute stage passed off, but suddenly one morning his right knee joint was found to be swollen and distended with all other signs of inflammation, and the movements became very difficult. I applied Scott's dressing, and ordered dry fomentations and internally potassium iodide with sodii salicylas.

Next morning I found that the right knee joint was more swollen and distended, and the other knee joint was also involved. He complained of severe pain in both the joints and had had no sleep throughout the whole night. He could hardly move on his bed. The presence of fluid in the right knee joint could be detected.

As it was not possible to get any vaccine, I remembered the use of milk intramuscularly. As there was no sterilised milk in my stock, I took milk from my own healthy cow, about an ounce, and boiled it for fifteen minutes, when it had cooled down I took 3 c.cms. in a 5 c.cm. syringe and injected it into the gluteal muscles.

No reaction followed nor any untoward effect. The injection was repeated every alternate day with the dose being increased by 0.5 c.cm.

After three injections both the knees came to their normal shape and the movements became easier. I continued the injections up to 7 c.cms. and cure was effected in a fortnight. Now the man is doing his usual work and has no troubles.

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Indian Medical Gazette.

JUNE.

TROPICAL TYPHUS.

THE annual reports of the Institute for Medical Research, Federated Malay States, Kuala Lumpur, are always of exceptional interest, and that for 1929 by Dr. Neave Kingsbury is no exception, for its first 49 pages are devoted to reports on medical research work of a very high order. The chief interest in this section is a full report of the recent work carried out on tropical typhus, and this is so important that we propose to review it in our editorial columns. An interesting departure from usual procedure is that Dr. L. Anigstein of Warsaw was appointed to the institute as a research scholar on this disease during the year.

Between January 1927 and April 1929 there occurred 164 cases of tropical typhus, of which 129 occurred in endemic form on an oil palm estate near Kuala Lumpur, and the remainder were scattered elsewhere in Malaya. A curious feature of the disease is the frequent association of only slight grades of fever with stupor or delirium; such cases may end fatally. A mild suffusion of the eyes is very characteristic of the disease and the chief complication is bronchitis or broncho-pneumonia, usually supervening in the second week. The case mortality rose from 4 per cent. in 1927 to 14.7 per cent. in 1929.

At post-mortem there is no characteristic naked-eye change; the heart may show minute hæmorrhages beneath the epicardium or on the papillary muscles. In the brain there is a slight but definite perivascular infiltration of the smaller pre-capillaries with mononuclear cells. In the walls of these pre-capillaries, and usually lying in an intracellular position, are minute diplococcal bodies—apparently Rickettsia. Similar forms are also found in the large pyramidal cells of the cerebral cortex. A few focal areas of cellular infiltration are also present.

Of laboratory animals the guinea-pig and the rat are the most susceptible, but results in these animals are uncertain. There may be fever for 5–8 days with decline in body weight. At autopsy the lungs are congested with hæmorrhagic infarcts. A very constant finding in infected male guinea-pigs is a hæmorrhagic semi-gelatinous exudate in lesions in the testis, and marked injection of the tunica vaginalis. The same pathological and histological changes are found in the brains of infected guinea-pigs as in man. When the local strain of *Proteus* X-19 is used, the majority of animals infected show a definite rise in agglutination titre.

The many attempts made to isolate the causative organism from man and from infected animals yielded only partially successful results. In some animals pathological changes corresponding to those of the natural disease occurred, and the Weil-Felix reaction was positive. Complement deviation tests also gave only partially positive results. There is usually mild leucopenia during the first week of the disease, followed by a rise in the leucocyte count, and with the onset of broncho-pneumonia this rise may be marked. There is a definite drop in the percentage of polymorphonuclears.

Turning to epidemiology, the disease is not seasonal and cases have occurred in every month of the year. Tamils especially are affected, and no less than 121 out of the 139 cases recorded in Tamils occurred on the oil palm estate mentioned. Males, especially those working among oil palms, are far more affected than females. Cases have also been encountered amongst Europeans engaged in engineering work in the jungles. It is especially in Tamil coolies engaged in harvesting and pruning oil palms that the chief incidence of the disease occurs, and there is a close connection between tropical typhus and oil palms. With the onset of the pruning season the disease sets in virulently, and drops off as the pruning season ends. It is likely that the vector of the disease may be found in the bunches of over-ripe fruit and lower leaves that accumulate and decay around the base of the tree during the process of pruning.

Recovery from the disease is apparently accompanied by a lasting immunity. Fletcher and Lesslar having suggested in a previous report that rats may be a reservoir of the infection, a systematic examination of the rats on the oil palm estate concerned was carried out. In 6 out of 80 rats caught on the estate pathological lesions corresponding to those in experimentally-infected rats were seen, Rickettsia-like bodies were present, and in one instance a rat's serum gave a positive Weil-Felix reaction to the "K" strain of *Proteus* X-19 to a dilution of 1 : 250; this rat showed marked testicular lesions and the presence of Rickettsia-like bodies in smears from the tunica vaginalis.

The patients are free from lice, and attempts at experimental transmission by lice (brought from Poland by Dr. Anigstein) were only partially successful. A small number showed Rickettsia-like bodies, and passage of emulsions of positive lice into two out of three guinea-pigs caused no fever, but death after 20 days with loss of body weight, enlargement of the spleen, and characteristic lesions in the testes. On the other hand the louse cannot be the vector in Malaya; the body louse is not existent in that country, and head lice cannot be associated with the epidemiological observations on the oil palm estate.

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An examination of coolies the moment they came in from work among the oil palms was next instituted; the men were stripped and examined by assistants provided with magnifying glasses. As a result of 464 such examinations, 88 arthropods in all were collected, of which the majority were larval Trombidiidæ. Collections of mites were made from the decayed male flowers of oil palms, and these yielded a large amount of material which is still under investigation. The ectoparasites of rats were studied, and in all 21 species were identified; *Trombicula deliensis* was found to be a common ectoparasite of rats—especially of those coming from the infected oil palm estate.

At this point, this most interesting report terminates, but it is clear that further investigations will be pursued. Certainly the ætiology of this curious disease must be very fully investigated. Whilst clinically closely resembling typhus, all the evidence shows that it cannot be louse-borne. Its chief characteristic is its sporadic incidence, and, in Malaya, its very close association with the oil palm.

R. K.

REFERENCES.

THERE is a great deal of misunderstanding amongst writers on medical and, no doubt, on other subjects regarding the proper use of references. It is perfectly allowable for various writers to have different ideas on the way in which references should be presented, but as to their function it seems to us that there can be no two opinions. References are included in a paper for the benefit of the reader, not to demonstrate the erudition of the writer, or to gratify the person or persons to whose work the reference is made. Under this heading a writer should give the details necessary for the reader to look up and confirm any statement or opinion which he, the writer, has attributed to any other writer, or claims for himself, *specifically* in the paper to which the references are appended. If, for instance, in his paper he writes "Smith is of the opinion—but on the contrary Jones stated," then in the references under the names of Smith and Jones, respectively, he should give sufficient details to enable the reader to look up the articles, or books, in which Smith expressed his opinion and Jones made the statement. On the other hand if he writes "In my student days I was taught...but now the general opinion seems to be..." without referring to any specific writer or book, he should not give a list of his medical-school text-books or include "Medical Annual, 1931" amongst his references.

Here a distinction should be made between "references" and a "bibliography," although the latter is frequently used as if it were a synonym of the former. A bibliography of any author or subject is a complete list of books, papers, etc., written by that author or on that subject, as the case may be. To prepare a complete bibliography of any subject, however limited, is an ambitious undertaking and is seldom attempted except in a monograph. In certain circumstances, such as in a text-book, where a complete bibliography would be out of place it is permissible to give a "select bibliography" for the guidance of students previously unfamiliar with the subject, but in this case it should be labelled as such.

In the matter of references sins of omission and sins of commission are equally common; the usual forms of malpractice are these:—

(*a*) Giving no references at all, or giving totally unintelligible ones such as, "British Medical Journal, 1931" without reference to subject, author, volume, or page.

(*b*) Giving a long list of references, mostly to foreign writers in foreign journals which the author has quite obviously not seen in the original, but has copied wholesale from some recent paper on the same subject.

(*c*) Giving a list of his own publications, or of those of his administrative superiors whom he wishes to please, though these may not be entirely relevant to the subject.

(*d*) Giving long lists of references only half of which are referred to specifically in the text, yet omitting an equally large number of papers by writers from whom he has quoted freely. Though this sin is frequently committed by well-known and prolific writers it is a form of laziness, or at any rate shirking of the responsibility they have undertaken in producing the book. They have neglected to refer in the text to authors with whose work they are familiar and they have not troubled to look up the original papers of other authors to whom they refer specifically.

(*e*) Finally, giving incorrectly the author's name, the title of the paper, the name of the journal, the year of publication, the number of the volume or the number of the page. In many cases this is due to carelessness, in others to the dangerous habit of copying references from another writer without verifying them. It is difficult to say which is the greater crime, to originate an error or to perpetuate that of some other writer.

We now come to the form in which references are presented; we will confine ourselves to articles in scientific journals. Different journals adopt different methods and we do not propose to weigh the pros and cons. It is, however, very desirable that there should be some degree of uniformity in the presentation of references in any single journal. In this matter the editor is to a certain extent dependent on his contributors, as not only does the rearranging of references entail a considerable amount of labour, but in some instances they are given in such a way as to make this quite impossible.

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The system which we prefer is that which is now adopted by all the more scientific, as opposed to clinical, medical journals in England. It is a simple method, it has many advantages over other methods—both from the reader's and the printer's points of view—and it has no disadvantages.

In the text you write "Smith (1941) is of the opinion—but on the contrary in 1942 Jones stated—." At the end of the paper under references you put,

Jones, H. E. (1942). Oral Transmission of Visceral Leishmaniasis. *Indian Med. Gaz.*, LXXVII, 64.

Smith, J. A. (1941). On the Transmission of Kala-azar by the Sandfly, *Phlebotomus argentipes* var. *sheffield*. *Indian Journ. Med. Res.*, XXVIII, 4321.

The references are put in alphabetical order according to the name of the writer. When several references are made to the same writer they are placed in chronological order. In the event of there being two or more references in the same year applying to the same writer, a small italicised letter appears after the date of the second and subsequent references, both in the text and in the reference itself. Thus, had there been some previous reference to the work of Smith in the same year, you would write "Smith (1941*a*) is of —," and for subsequent references for the same year "Smith (1941*b*)," "Smith (1941*c*)," etc. When the reader comes across "Smith (1941*c*)" in the text, however many references there are, however many papers Smith has written, and however many of these were in the same year, it will be a matter of a few seconds only to find the exact article to which reference is made. In the event of Smith having contributed a number of important papers on the same subject to which only one reference is made in the text, you write "Smith (1940, 1941 and 1941*a*)" and under each date each reference is given separately. There are many advantages of this method over that of numbering the references consecutively and giving corresponding numbers in the text, not the least of these is that at any time, even in the galley proofs, it is possible to add another reference without extensive corrections; if the consecutive-number system is used the numbers of all references which come after the added reference have to be altered and all the corresponding numbers in the text searched for and corrected, whereas if the system we are advocating is used then, at the very most only the italicised letters after the date of papers by the same author in the same year may require correction.

In the text the initials of a writer are usually omitted; in the references they should be included, appearing after his name.

Whether the full title of the article should be given is a matter of personal opinion; it is a point which is usually left for the decision of the contributor. There is no doubt whatsoever that from the point of view of the reader it is better to give the full title of the article; it does not help him to find the reference, but it gives him some indication of the aspect from which the subject has been treated and it will aid his memory if he is familiar with the work of the writer referred to. The omission of the title certainly saves space; this may be an important matter in certain circumstances, but we fear that the usual reason for writers omitting titles is to save themselves the trouble of looking them up and copying them correctly.

Next comes the name of the journal in which the article appears; this should be italicised. (Here one should perhaps mention that the underlining of a letter or word by a single line in manuscript or typescript indicates to the printer that the word should appear in italics.) The name of the journal is almost always abbreviated. It is exceedingly difficult to lay down any definite rule for such abbreviation. The objective should be to abbreviate as much as possible but in such a way that every reader will know to which journal reference is made. Most medical men in this country understand what is meant by the abbreviation "I. M. G." but it is more than probable that one in Czechoslovakia would not; one of the first rules, therefore, is that proper names and adjectives derived from proper names should be given in full. Some authors and editors adhere rigidly to this rule, but the majority make exceptions of the words "British" and "American," using the abbreviations "Brit." and "Amer.". This question of abbreviation is one of such wide division of opinion that any hope of obtaining uniformity amongst even a single class of journal in any one country is almost impossible. The usual practice is to reduce the words to a single syllable rather than to a single letter. For the word "Journal" the abbreviations "J.", "Jl.",. "Jour." and "Journ." are all commonly used in reputable journals, but this does not exhaust the full list of possible abbreviations; our contributors frequently attempt to foist "Jo." and "Jr." upon us.

The next step is to indicate more exactly where the article in question is to be found. All that is necessary is to give the number of the volume in which it appears and the number of the page on which it begins. The number of the volume should be given in Roman figures and the number of the page in Arabic figures. It is unnecessary to precede these figures by the abbreviations 'vol.' and 'p.', respectively, but they take up very little extra space so that for this reason few editors would delete them, and some prefer to have them included. To give any further information is quite unnecessary. The "number" of a journal

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is usually only a temporary convenience which disappears when the journal is bound. Likewise it is superfluous to give the month in which the paper was published as it does not in any way assist in finding the paper; to search for a paper when the month of publication but not the page number is given is a particularly irritating task, as publishers do not always cater for this annoying practice by putting the month and year at the top of each page. Any further reference to the year is obviously unnecessary. In the case of some journals, usually those published weekly, there are two volumes during each year. These are frequently numbered "Vol. I" and "Vol. II," a second volume number calculated from the commencement of publication of the journal also being given. In such a case it facilitates reference to give the smaller number; the year has already been given, so that no confusion should arise.

When reference is made to a book, the date which appears after the author's name is that of the year of publication of that particular edition of the book. If the book is by several authors, each contributing separate chapters, then it can be treated as a journal, the title of the chapter referred to being given, followed by the title of the book in italics, the edition (e.g., "3rd ed.") and the number of the page on which the chapter begins. If the book is by one author, or by one or more authors writing conjointly, then it is unusual to give more than the title of the book, this in italics. In the case of all books it is usual to conclude the reference by giving the name of the publisher and the name of the town in which the book is published; if one item is to be omitted it should be the former.

Responsibility for the correctness of a reference always rests with the author.

As we have already said uniformity in the matter of references is very desirable. It is a point on which some editors insist, going so far as to return manuscripts to authors when extensive corrections are required. Some journals publish from time to time a list of abbreviations of the names of journals to which reference is commonly made; but it is very difficult to compile a list which is comprehensive. However, by turning up the back numbers of the journal to which they are submitting papers, authors will usually be able to decide which abbreviation is most frequently used.

For the convenience of contributors we are appending a list of a hundred journals with the abbreviations which we should like them to use. The list is not by any means comprehensive, but we hope that it will act as a guide.

In the past we have always allowed contributors considerable latitude in this matter. We hope that in future they will co-operate with us in achieving greater uniformity.

Since writing the above we have received our copy of a recent number of *Science*, a well-known American journal, in which a writer who has had considerable editorial experience complains bitterly of the inaccuracy of contributors in the matter of references—or "citations" as they are frequently called in America. We have given an abstract from this paper in our current topics section in this number. Amongst other things he says "few editors take the time and trouble to check up on these errors." In our opinion such work is well outside the duties of an editor. This writer apparently does "check up" the references of contributors. He complains that nearly half the references submitted are incorrect; speaking from our experience of the past few years, we can claim that at least 90 per cent. of the references in papers submitted to us have required correction or completion in some detail or other, but we do not claim that they have always received it.

Whilst admiring whole-heartedly this writer's industry we cannot guarantee to emulate it, and we must repeat that *the responsibility for the correctness of references always rests with the author.*

American Journal of Hygiene.	*Amer. Journ. Hyg.*
American Journal of the Medical Sciences.	*Amer. Journ. Med. Sci.*
American Journal of Obstetrics and Gynæcology.	*Amer. Journ. Obstet. & Gyn.*
American Journal of Ophthalmology.	*Amer. Journ. Ophth.*
American Journal of Pathology.	*Amer. Journ. Path.*
American Journal of Physiology.	*Amer. Journ. Physiol.*
American Journal of Public Health.	*Amer. Journ. Pub. Health.*
American Journal of Syphilis	*Amer. Journ. Syph.*
American Journal of Tropical Medicine.	*Amer. Journ. Trop. Med.*
The Analyst	*Analyst.*
Annales de l'Institut Pasteur.	*Ann. Inst. Pasteur.*
Annals of Tropical Medicine and Parasitology.	*Ann. Trop. Med. & Parasit.*
Archiv für Dermatologie und Syphilis.	*Arch. Dermat. u. Syph.*
Archives of Dermatology and Syphilology.	*Arch. Dermat. & Syph.*
Archives de l'Institut Pasteur.	*Arch. Inst. Pasteur.*
Archives of Internal Medicine.	*Arch. Intern. Med.*
Archiv der Pharmacie ..	*Arch. Pharm.*
Archiv für Schiffs- und Tropen-Hygiene.	*Arch. Schiffs- u. Trop.-Hyg.*
Archives of Pathology ..	*Arch. Path.*
Australian Journal of Experimental Biology and Medical Science.	*Australian Journ. Exper. Biol. & Med. Sci.*
Biochemical Journal ..	*Biochem. Journ.*
Biochemische Zeitschrift ..	*Biochem. Zeitschr.*
British Journal of Actinotherapy.	*Brit. Journ. Actinotherapy.*
British Journal of Dermatology and Syphilis.	*Brit. Journ. Dermat. & Syph.*
British Journal of Experimental Biology.	*Brit. Journ. Exper. Biol.*
British Journal of Experimental Pathology.	*Brit. Journ. Exper. Path.*

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British Journal of Ophthalmology.	*Brit. Journ. Ophth.*
British Journal of Surgery.	*Brit. Journ. Surg.*
British Journal of Venereal Diseases.	*Brit. Journ. Ven. Dis.*
British Medical Journal ..	*Brit. Med. Journ.*
Bulletin of Entomological Research.	*Bull. Entomol. Res.*
Bulletin of Hygiene ..	*Bull. Hyg.*
Bulletin of the Johns Hopkins Hospital.	*Bull. Johns Hopkins Hosp.*
Bulletin de l'Institut Pasteur	*Bull. Inst. Pasteur.*
Bulletin de la Société de Pathologie Exotique.	*Bull. Soc. Path. Exot.*
Ceylon Journal of Science (Section D.).	*Ceylon Journ. Sci. (Sec. D.).*
China Medical Journal ..	*China Med. Journ.*
Comptes Rendus des Séances de la Société de Biologie.	*Compt. Rend. Soc. Biol.*
Deutsche medizinische Wochenschrift.	*Deut. med. Woch.*
Edinburgh Medical Journal.	*Edinburgh Med. Journ.*
Folia hæmatologica ..	*Folia hæmatol.*
Geneeskundig Tijdschrift voor Nederlandsch-Indie.	*Geneesk. Tijdschr. Nederl.-Indie.*
Heart	*Heart.*
Indian Journal of Medical Research.	*Indian Journ. Med. Res.*
Indian Medical Gazette ..	*Indian Med. Gaz.*
Indian Medical Record ..	*Indian Med. Rec.*
Irish Journal of Medical Science.	*Irish Journ. Med. Sci.*
Japan Medical World ..	*Japan Med. World.*
Journal of Agricultural Research.	*Journ. Agric. Res.*
Journal of the American Medical Association.	*Journ. Amer. Med. Assoc.*
Journal of Bacteriology ..	*Journ. Bact.*
Journal of Biochemistry ..	*Journ. Biochem.*
Journal of Biological Chemistry.	*Journ. Biol. Chem.*
Journal of Comparative Pathology and Therapeutics.	*Journ. Comp. Path. & Therap.*
Journal of Experimental Biology.	*Journ. Exper. Biol.*
Journal of Experimental Medicine.	*Journ. Exper. Med.*
Journal of General Physiology.	*Journ. Gen. Physiol.*
Journal of Helminthology ..	*Journ. Helminthol.*
Journal of Immunology ..	*Journ. Immunol.*
Journal of Infectious Diseases.	*Journ. Infect. Dis.*
Journal of Laboratory and Clinical Medicine.	*Journ. Lab. & Clin. Med.*
Journal of the Medical Association of South Africa.	*Journ. Med. Assoc. South Africa.*
Journal of Metabolic Research.	*Journ. Metab. Res.*
Journal of Parasitology ..	*Journ. Parasit.*
Journal of Pathology and Bacteriology.	*Journ. Path. & Bact.*
Journal of Pharmacology and Experimental Therapeutics.	*Journ. Pharm. & Exper. Therap.*
Journal of the Philippine Islands Medical Association.	*Journ. Philippine Islands Med. Assoc.*
Journal of Physiology ..	*Journ. Physiol.*
Journal of Preventive Medicine.	*Journ. Prev. Med.*
Journal of State Medicine.	*Journ. State Med.*
Journal of Tropical Medicine and Hygiene.	*Journ. Trop. Med. & Hyg.*
Lancet	*Lancet.*
Malayan Medical Journal ..	*Malayan Med. Journ.*
Mededeelingen van den dienst der volksgezondheid in Nederlandsch-Indie.	*Mededeel. dienst volksgezondh. Nederl.-Indie.*
Medical Journal of Australia	*Med. Journ. Australia.*
Medicine	*Medicine.*
Medizinische Klinik ..	*Med. Klin.*
Memorias do Instituto Oswaldo Cruz.	*Mem. Inst. Oswaldo Cruz.*
Münchener medizinische Wochenschrift.	*Münch. med. Woch.*
Nature	*Nature.*
New England Journal of Medicine.	*New England Journ. Med.*
Parasitology	*Parasitology.*
Philippine Journal of Science.	*Philippine Journ. Sci.*
Presse médicale ..	*Presse méd.*
Proceedings of the Royal Society of Medicine.	*Proc. Roy. Soc. Med.*
Proceedings of the Society for Experimental Biology and Medicine.	*Proc. Soc. Exper. Biol. & Med.*
Public Health Bulletin ..	*Pub. Health Bull.*
Quarterly Journal of Experimental Physiology.	*Quart. Journ. Exper. Physiol.*
Quarterly Journal of Medicine.	*Quart. Journ. Med.*
Quarterly Journal of Microscopical Science.	*Quart. Journ. Micro. Sci.*
Quarterly Review of Biology.	*Quart. Rev. Biol.*
Records of the Indian Museum.	*Rec. Indian Mus.*
Rivista di Malariologia ..	*Riv. Malariol.*
Transactions of the Royal Society of Tropical Medicine and Hygiene.	*Trans. Roy. Soc. Trop. Med. & Hyg.*
Tropical Diseases Bulletin ..	*Trop. Dis. Bull.*
United States Naval Medical Bulletin.	*United States Nav. Med. Bull.*
University of California Publications in Zoology.	*Univ. California Pub. Zool.*
Zeitschrift für Hygiene und Infektionskrankheiten.	*Zeitschr. Hyg. u. Infektionskr.*
Zeitschrift für Immunitätsforschung und experimentelle Therapie.	*Zeitschr. Immunitätsforsch. u. exper. Therap.*
Zentralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten.	*Zentralbl. Bakt.*

Special Article.

THE "CONTROL" OF MALARIA WITH SPECIAL REFERENCE TO TREATMENT.*

By C. A. GILL, D.P.H.,
LIEUTENANT-COLONEL, I.M.S.,
Director of Public Health, Punjab.

IT may at first sight appear that the "control" of malaria is not a matter of much immediate interest to medical men actively engaged in the practice of their profession. If there be any here who hold this view, I must join issue with them. It is true, in these days of specialization, that the curative and preventive aspects of medicine are often attended to by separate agencies and that, whilst the Medical Department is

* A lecture delivered at Lahore on March 7th, 1931, to the Punjab Branch of the British Medical Association.

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concerned with treatment, the prevention of disease is the special function of the Public Health Department.

The reasons responsible for the introduction of dyarchy into medical practice were no doubt weighty, but it cannot be too strongly or too often emphasized that, from the practical and scientific point of view, the prevention and treatment of disease are so closely inter-related that they cannot be separated without grave detriment—in fact dyarchy, if carried to its logical conclusion, must lead to anarchy in medical matters.

After all, even the surgeon in excising a diseased appendix is really engaged in preventing disease and in prolonging life, and his aseptic technique is solely devised for the purpose of preventing sepsis. Similarly the physician in prescribing drugs and other remedies endeavours not only to alleviate symptoms but to cure the disease and to prevent its recurrence. Here, however, he has the welfare of the individual alone in mind, but when he is engaged in the treatment of maladies belonging to the large group of communicable diseases, his treatment is designed not only to cure the patient, but to prevent him from being a source of danger to others. Take a case of ankylostomiasis, for example. Here the alleviation of the symptoms by proper treatment cannot be regarded as complete, either from the point of view of the individual or of the community, until it has been proved that the stools of the patient no longer contain the ova of the hookworm. In this case, therefore, prevention and treatment are indissolubly linked, and on the efficient treatment of ankylostomiasis depends not only the cure of the individual, but the prevention of the disease in the community. But efficient treatment is dependent upon accurate diagnosis, in the absence of which it is not possible to detect with certainty the presence of the disease or to check the effect of treatment.

An accurate diagnosis can, however, only be made with the aid of a microscope, and medical practitioners do not always possess or, if they possess, do not commonly use this instrument, which in this country, at any rate, is at least as essential a part of the equipment of a physician as a stethoscope or a hypodermic syringe. Unless, therefore, medical practitioners are equipped with microscopes and unless they have the necessary knowledge to enable them to diagnose the disease, and the drugs to treat it efficiently, they can do full justice neither to their patients nor to the community.

It is not necessary to multiply instances of the inter-relation of treatment and prevention. It is clear that every medical man engaged in medical practice has important duties to perform in the sphere of preventive medicine and that in treating the individual he is also engaged in controlling disease in the community. It would, therefore, be a great misfortune if the separation of the medical profession into curative and preventive branches, which is largely a matter of administrative convenience, should be allowed to obscure the fact that all medical men, whatever their speciality, must bear prominently in mind the preventive point of view. Prevention, indeed, is the key-note of the modern medical curriculum, and it is probable that the physician of the future will be increasingly concerned in preventing, rather than in treating, disease. Apart from the question of finance, it is indeed neither common sense nor common humanity to multiply institutions for the treatment of diseases, many of which would never have occurred if the preventive point of view had been taken into account by the physician.

It is said that in China the medical man is paid for keeping people in health and that he receives no fees if they fall sick. This system is perhaps not universally applicable, but it is surely sound and the right attitude to adopt, and it may be that some day the rewards for keeping people healthy will exceed those now given for curing the sick.

I make no apologies for this digression, which is intended to indicate the spirit in which I propose to approach the question of the "control" of malaria.

Now malaria, as everyone knows, is a communicable disease, and we all know—at least we have been told so *ad nauseam*—that its prevention is merely a matter—quite a simple matter in the opinion of some people—of destroying mosquito larvæ. I do not propose to discuss this vexed question here, but, whilst I admit that the elimination of the mosquito is a valuable and, if practicable, an infallible, method of controlling malaria, it must not be thought that it is the only method or that because medical men engaged in the practice of their profession cannot take part in anti-mosquito campaigns they have no responsibilities in respect of the prevention of malaria.

Now what is malaria? It is not a disease of mosquitoes but of man; it is not spread by all mosquitoes but only by infected mosquitoes, and mosquitoes can only become infected by biting persons in whose blood the sexual forms of the malaria parasite are circulating. From a recital of these elementary facts—which, however, sometimes appear to escape attention—it surely follows that the prevention of malaria must be envisaged both from the points of view of the carrier-insect and of the malaria parasite. The mosquito enthusiasts tell us, quite truly, that if there were no mosquitoes there would be no malaria, but they sometimes fail to realize—or at least to mention—the equally obvious fact that if there were no malaria parasites circulating in the blood of man malaria would quickly disappear from the face of the earth, even if not another mosquito were destroyed. It is, therefore, abundantly clear that the "control" of malaria must be regarded both from the standpoint of the mosquito and of the malaria parasite. I do not propose to deal to-day with the large subject of *anti-mosquito measures*, the prosecution of which comes within the special province of the sanitarian, but I propose to confine my remarks to *anti-parasite measures* and to consider the important part which the medical practitioner engaged in the treatment of malaria is capable of playing in the "control" of the disease.

Quinine, in some form or other, is of course our sheet-anchor in the treatment of malaria, but by reason of the fact that it exercises little direct effect upon the sexual forms of the parasite (gametocytes) the physician in the past has had to be satisfied with obtaining clinical cures, which, however, frequently left the patient capable of infecting mosquitoes and of spreading the disease. Several years ago German chemists succeeded in manufacturing a synthetic quinoline derivative which they termed plasmoquine. It has been shown by numerous observers that this drug exercises a profound effect upon gametocytes, more especially of the malignant tertian parasite, as the result of which they are no longer capable of infecting mosquitoes. W. W. Clemesha also finds that the administration of plasmoquine in association with quinine greatly reduces the number of relapses. The discovery of plasmoquine, therefore, not only marks a great advance in the treatment of malaria, but it renders it necessary for us to revise our ideas regarding the part which the medical practitioner may play in the "control" of malaria in the community. It is, in fact, clear that if plasmoquine were administered to every one of the million or so persons treated each year for malaria in the Punjab, the number of gametocyte carriers would be immensely reduced and, as a consequence, without any increase of medical staff or much expenditure, a great step forward in the control of malaria in this province would have been achieved. Until recently there was a certain hesitation in administering plasmoquine, except under medical supervision, owing to the occasional occurrence of toxic symptoms, but it has lately been shown by Clemesha and others that in the reduced doses now recommended it can be given with impunity on a large scale and with extremely beneficial results in reducing the incidence both of attacks and of relapses and in lowering the spleen rate of communities.

Various methods of administering the drug are recommended. Clemesha, who has given many thousands of doses, gives, in malignant tertian malaria,

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10 grains of quinine three times a day until the temperature comes down to normal, followed by 10 grains of quinine and one tablet of plasmoquine compound (which contains about 5 grains of quinine sulphate and 0.01 gramme of plasmoquine) once a day for seven days. Then tonic pills are given for one week, followed by quinine and plasmoquine, as before, for another week. Knowles has obtained successful results with an even shorter course of treatment. He gives 20 grains of quinine in solution with alkalies daily for 10 days and 0.01 gramme of plasmoquine daily for the last six days of treatment. It would thus seem that the treatment of malaria is steadily becoming, in the case of adults, simpler, shorter, and more effective.

In children whose health is frequently undermined by malaria, in spite of the absence of definite febrile attacks, and who are also often undetected gametocyte carriers, the use of plasmoquine has not apparently been employed, as yet, on a large scale; but if it is proved that this drug can safely be administered to children, another great advance in the control of malaria will have been achieved. At present, children, owing to their natural distaste for quinine, are apt to be imperfectly treated. I would remind you, however, that there is a preparation of quinine termed Euquinine which is practically tasteless; but, although it is not costly, it is not apparently widely used even in private practice. W. W. Clemesha administers it in the form of Euquinine-milk, which he states is extremely popular with children. He mixes Euquinine with sweetened condensed milk so that each teaspoonful contains 2½ grains of Euquinine and 1, 2, or 3 spoonfuls of this mixture are given daily to children according to their age. For further details about treatment I must refer you to current literature, and more especially to the articles by W. W. Clemesha and R. Knowles in the December 1930 and January 1931 numbers of the *Indian Medical Gazette*.

In conclusion let me once more emphasize the new possibilities which the discovery of plasmoquine opens up in respect of the treatment of malaria and the important part that the efficient treatment of the sick is capable of playing in the control of malaria. I hope, also, that I have made it clear that the responsibilities of the physician are not merely confined to the cure of the individual, but that in his treatment of the sick he has also to discharge a public duty to the community and to the state.

Medical News.

THE EIGHTH ANNUAL ALL-INDIA CONFERENCE OF MEDICAL RESEARCH WORKERS.

YEAR by year this annual conference assumes an increasing importance. It is not in any way an executive, but a purely advisory body. Yet its importance in shaping medical research policy in this country under the Indian Research Fund Association, in bringing to the notice of Government the urgency of research work on different lines, and in dealing in order of importance with the big medical problems of India, is very great. A résumé only of the official *Proceedings* of the Conference is printed for circulation to medical research workers under the Research Fund Association, but the importance of the Conference to medical policy in India is such that we may attempt a general summary of the proceedings. What follows is written from notes taken by a single delegate, and therefore, may not be a completely accurate account of what happened.

The Conference was held in the library of the Calcutta School of Tropical Medicine from the 17th to the 22nd November, 1930. There were 55 delegates and several visitors present, as follows: Government of India 15, Army Department 1, Assam 1, Bombay 2, Burma 2, Bihar and Orissa 2, United Provinces 1, the Punjab 3, Madras 3, Bengal (including the Calcutta School of Tropical Medicine) 25; the visitors included Dr. Alexander Mitchell, Chief Health Officer of the Union of South Africa, and Mr. R. Senior-White, representing the Indian Railway Board and the Bengal-Nagpur Railway. The President was Major-General J. W. D. Megaw, C.I.E., K.H.P., I.M.S., Director-General, Indian Medical Service.

In his opening address, General Megaw said that he might claim to be the father of the Conference since he had first suggested such an annual meeting of research workers eight years ago. The Conference had no executive powers at all, for such were vested in the Governing Body of the Indian Research Fund Association, as advised by its Scientific Advisory Board. On the other hand the value of this annual conference was very great. Not only did it enable research workers to get together and compare notes; it also materially affected medical research policy in India; and—when necessary, the unanimous opinion of such a conference, containing, as it did, most of the medical research workers of India and most Directors of Public Health in the provinces—was of considerable influence in shaping the general policy of Government in medical research matters. The chief value of the Conference indeed lay in its very informality.

It had been asserted in the past that work under the Indian Research Fund Association was a closed enclave, but the present position entirely negatived this suggestion. The following were the figures for whole-time employees under the Indian Research Fund Association:—

4 Indian Medical Service officers—all Europeans;
11 military assistant or sub-assistant surgeons—all Indians or statutory natives of India;
37 independent medical practitioners of whom 4 were Europeans and 33 Indians;
21 independent workers, non-medical, of whom 3 were Europeans and 18 Indians;

in addition very numerous grants were made to both European and Indian workers whose salaries were derived from other sources.

The valuable work carried out by the Indian Research Fund Association received full publicity in medical circles by its publication in the *Indian Journal of Medical Research*, the supplementary *Indian Medical Research Memoirs*, and the newly established *Records of the Malaria Survey of India*; but he was of opinion that the Association wanted more limelight in the lay press. The public had but little idea of the immense amount of research work which was being carried on steadily year in year out under the Association. Its resources were limited, but its programme was a very ambitious one. With regard to the encouragement of young Indian medical research workers, the establishment of scholarships was an important beginning, but the chief trouble was the ever-present danger that the capable clinical research worker would desert the field of pure research for the more attractive one of private practice. No end of important work had been carried out in India without official aid; he would instance the work of Sir Ronald Ross and Sir Leonard Rogers. Sir C. V. Raman, who had just received the Nobel prize in physics, had worked his own way up, almost unassisted. On his own behalf and on behalf of all the workers he expressed his pleasure at the award of the Nobel prize to Dr. Raman. In medical research work there was no such thing as a monopoly; the opportunities in India were so vast that there was room for all. But, with regard to the Association, there was a necessity for the presentation of clear-cut programmes for research; the more definite a worker was with regard to the research which he proposed to carry out, and the financial requirements related thereto, the more sympathetic would he find the Advisory Board. Finally, he dwelt upon the international importance of medical research work in India; in connection with such subjects as cholera and bacteriophage, for instance, the eyes of the whole world were upon India. Yet workers in India could not be dictated to with regard to their programmes; they had to consider the needs of India first, and the possibility of international enquiries second.

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Major-General J. D. Graham, C.I.E., I.M.S., Public Health Commissioner with the Government of India, next outlined the alterations which had recently been proposed in the composition of the Governing Body of the Association; these included the admission of representatives of the medical faculties of the different Indian universities and of the general medical profession; the present Governing Body was now a more democratic and less official body than formerly. The question of a recruitment board had been under consideration during the year, and a conference which met at Simla in July 1930 had drafted a report which was now under the consideration of the Government of India. In the meantime an advisory and consultative board on recruitment had been constituted in England; it included Sir Leonard Rogers, Sir Walter Fletcher, Sir Andrew Balfour, Professor Dale—representing the Royal Society—and Professor Mackie of Edinburgh University. If suitable men for research appointments were available at Home such a strong committee could be trusted to pick them out.

The Conference then proceeded to appoint five sub-committees to deal respectively with the subjects of cholera, plague, kala-azar, malaria, and rabies; these sub-committees consisted chiefly of the research workers engaged on the study of these subjects.

General Graham then turned his attention to the establishment of an all-India Institute of Hygiene and Public Health in Calcutta undertaken with the generous financial aid of the Rockefeller Foundation. Here the position was that a site in Central Avenue, adjacent to the Calcutta School of Tropical Medicine, had been acquired and cleared, and the new building would probably be ready for an official opening ceremony by January 1932. A co-ordination committee had been appointed to deal with the relationship of this new all-India institute to the Research Fund Association, etc. With regard to the proposal for an all-India Central Medical Research Institute at Dehra Dun, a committee had been appointed, and its report was now under the consideration of Government; it was impossible to foresee the future, but it was unlikely that any definite scheme for a new institute would materialise during the next few years.

The action taken on the resolutions of the 1929 Conference was next recorded.

The continued publication of the *Indian Journal of Medical Research* and allied *Memoirs* was the next subject considered. A sum of Rs. 30,000 a year was recommended as allotment for the publication of these journals. The present position is that 900 copies of both publications are printed off, of which 360 go to subscribers in and outside India, and 198 go as exchange copies in India and abroad, leaving the remainder for future requirements. The *Journal* certainly disseminates the results achieved by research workers in India throughout the medical world, but further publicity in lay papers is necessary. The Conference recorded its very great gratitude to Colonel Christophers, I.M.S., for his exceedingly valuable services for many years as Honorary Editor of the *Journal*. The *Journal* is a model of what a medical research journal should be, and, if one includes the additional quarterly *Medical Research Memoirs* supplements, at Rs. 16 a year it is about the cheapest valuable medical journal in the world.

The next item considered was the present financial position of the Indian Research Fund Association. The Government of India's annual grant-in-aid is expected to remain at the usual figure of Rs. 7.5 lakhs, and the interest on investments at Rs. 2.11 lakhs. There is an income of Rs. 33,000 from contributions made by the local governments of Assam, Madras, and Bihar and Orissa towards the cost of the Kala-azar Commission and—owing to the scheme for a central research institute at Dehra Dun being dropped—a carried-forward balance of Rs. 2.10 lakhs. General Graham estimated that the approximate sum available for expenditure in 1931-32 would therefore probably be about Rs. 12.04 lakhs. In the future, however, if medical research work in India expanded in accordance with the real needs of the country, considerably more might be required. The chief difficulty at present was the discovery of suitable research workers for employment.

General Graham next read out the terms of reference of the newly constituted "Indian Drugs Enquiry Committee"—a subject fully dealt with in our editorial on p. 640 of our issue for November 1930. He next dealt with the two newly founded research scholarships—each of the value of Rs. 150 p.m., tenable for three years—from the grant by the Raja of Parlakimedi. This trust is to be administered by the Governing Body of the Indian Research Fund Association, with an advisory committee, in accordance with the Raja's wishes; and the scholarships are to be advertised in the public press. They are especially intended for students working in connection with the nutritional and dietetic enquiry.

The next question considered was the annual contribution of £500 to the Imperial Bureau of Entomology in London. There can be no question of the very great assistance which this Bureau has rendered for many years to workers under the Indian Research Fund Association. General Graham explained that he had approached the newly constituted Imperial Council of Agriculture, and suggested that they should contribute £250 and the Indian Research Fund Association £250. The Council of Agriculture, however, had decided on a subvention of only £100. He was very anxious to assist the Tropical Diseases Bureau; this bureau published the *Tropical Diseases Bulletin* and the *Bulletin of Hygiene*—journals which were of the utmost value to medical research workers in India; the Bureau, however, was experiencing the greatest financial difficulty, and fully deserved support. Discussion followed, one member pointing out that the Government of Ceylon, despite the stringency of their finances, subsidised the Tropical Diseases Bureau by £100 a year. Finally, the Conference was of opinion that the Imperial Bureau of Entomology should receive £200 a year, and the Tropical Diseases Bureau £300 a year.

General Graham next stated that he would attend the December 1930 Congress of the Far Eastern Association of Tropical Medicine at Bangkok as official delegate of the Government of India and of the Leprosy Commission of the League of Nations; Major Sinton would attend as official delegate of the Indian Research Fund Association; Colonel Stewart would attend as a Government of India delegate through the generosity of the Rockefeller Foundation; and Dr. Muir as a delegate of the Leprosy Commission of the League of Nations. Dr. Muir had recently been appointed a member of the Leprosy Commission of the League, and the F. E. A. T. M. Congress at Bangkok would be associated with a meeting of that Commission; there were several most important matters to be discussed. Further, the question of the creation of a world wide international organisation against leprosy, and of a world wide international journal would be discussed in Manila on the invitation of the Leonard Wood Leprosy Memorial Association.

General Graham next made a statement with regard to the report of the League of Nations Malaria Commission's study tour of India in 1929-30. He and Colonel Christophers had had to carefully revise the first draft of this report, whilst Colonel Christophers' lecture dealing with the history of malaria research in India had been added as an introduction. Major Sinton, Major Covell, Dr. Bentley and Mr. Senior-White had been co-opted as members of the Malaria Commission of the League, as the result of this tour. The report would shortly be available for distribution.

The Conference next passed to a detailed consideration of the reports by the various workers for 1929-30 on the research work which they had carried out with the grants provided, and to the proposals for 1931-32. (Here considerations of space preclude us from mentioning several minor proposals for small investigations, and we can deal only with the major proposals and big enquiries. The 1930 conference was extremely well

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organised and run; the previous circulation of all reports on work done and of new proposals for 1931-32 in the form of printed or cyclostyled memoranda, and the appointment of the five sub-committees, saved no end of time. General Megaw as President was necessarily firm with speakers who tended to exceed the time limit, and the Conference went through with business-like despatch.)

Kala-azar.

The report of the kala-azar sub-committee was first considered. Lieutenant-Colonel H. E. Shortt, I.M.S., gave a brief account of the work of the Kala-azar Commission in Assam during the previous year. Special attention had been paid to the possibility of the transmission of the disease by the oral route, and hamsters had proved to be very susceptible to infection by this channel. Work with *Phlebotomus argentipes* had been continued throughout the year, but again with disappointing results. The possible relationship of hookworm to kala-azar transmission had been under enquiry during the year. *L. donovani* had been found to remain viable in milk for four days, in soil moistened with water or urine for 24 hours, and to multiply in citrated milk which acts as a culture medium. The rôle of the reticulo-endothelial system in kala-azar had been studied, and work had been done on four allied species of *Trypanosomidæ* with a view to throwing light on the difficult transmission problem. Achlorhydria is usually present in kala-azar patients, and this might facilitate infection by the oral route. In this connection the sub-committee's proposals were: (*a*) that the Kala-azar Commission be closed down at the end of the current financial year; (*b*) that the Kala-azar Enquiry under Dr. Napier at the Calcutta School of Tropical Medicine be re-organised, strengthened, and enlarged by the inclusion in it of such workers as are freed by the closing down of the Kala-azar Commission; and (*c*) that Colonel Shortt should commence a new enquiry, to be carried out at Kasauli, into the transmission of the Indian *Trypanosomidæ* in general, in the hope that this may throw light upon the mode of transmission of Leishmania infections. The Conference agreed to these proposals.

Certain minor enquiries in connection with kala-azar were then considered. Dr. M. N. De of the Pathology Department, Calcutta Medical College, asked for a small grant to enable him to continue Major Shanks' investigation into the morbid histology of the spleen and liver in kala-azar; a very large amount of material had accumulated, but had not yet been studied. The Conference was in favour of this investigation, but advised that it should be associated with Dr. Napier's main enquiry. Dr. Napier reported that the enquiry in Calcutta had continued its work throughout the year; continued work on *Phlebotomus argentipes* had again been completely negative; the number of patients attending the treatment centre had fallen off rapidly, and both in Assam and Bengal there was evidence that the disease was passing into a non-epidemic period. The blood of cows had been examined, with a view to the possibility of their acting as reservoirs of infection, but so far only a trypanosome had been discovered in these animals. Intensive treatment with a 5 per cent. solution of Aminostiburea or of Urea-stibamine was capable of curing the disease in 6 injections, 0.5 gramme being given daily. The administration of liver extract had proved very useful in anæmic and resistant cases.

Dr. J. C. Ray asked for a continuation of his Leishmania vaccine enquiry; this deals chiefly with the cultivation of Leishmania on solid media, the serology of Leishmania infections, and experimental Leishmania infections in hamsters. Dr. Krishnan—formerly of the Kala-azar Commission—proposed to carry out an enquiry into kala-azar transmission in Madras Presidency. In the discussion on these proposals, reference was made to the fact that despite the waning of kala-azar in Assam and in Bengal, it was of the utmost importance that the transmission problem should be finally solved. It was proposed that, with the cessation of the Kala-azar Commission, Dr. Napier's enquiry should now become the headquarters of this research. Dr. Krishnan's enquiry could well be incorporated in the work at Calcutta; Colonel Shortt's and Dr. Ray's enquiries should be considered by the Scientific Advisory Board on their own merits. It was pointed out that the proposals for enlarging and strengthening Dr. Napier's enquiry would now mean the provision of Rs. 58,000 a year, but trained men from the Commission would be available for the expansion of the work. Dr. Napier said that he proposed to continue the work on the lines suggested by Colonel Shortt, with special attention to the possibility of transmission by the oral route, and any possible connection with ankylostomiasis. Dr. Bentley said that there were more than 150,000 cases treated in Bengal last year; he urged that the enquiry should still be carried on. The Conference passed a general resolution in favour of submitting the proposals of the sub-committee to the Scientific Advisory Board.

Nutritional diseases.

The discussion on this subject was introduced by Colonel R. McCarrison, I.M.S., in a very lucid and most instructive speech. Vesical calculus and allied conditions had been produced in white rats by the administration of diets deficient in fat-soluble vitamines and proteins. The addition of whole milk or butter to the diet prevented this. Laminated stones could be produced by alternate administration of normal and of deficient diets. Two main factors are present in the production of stone in India; deficiency of fat-soluble vitamines and of phosphates, and the presence in cereal grains, especially *atta* (whole wheat flour), of an unknown substance and of excess of lime. A great deal of work had been carried out on the composition of human vesical calculi; renal stones were always of the oxalate variety; experimentally-produced stones in rats were composed of triple phosphate, carbonate, hydroxide or a mixture of these; cattle stones were invariably of carbonate composition. Data with regard to the incidence of vesical calculus had been collected from civil surgeons all over India, and these awaited analysis. An experimental and histo-pathological study of the effects of a diet deficient in vitamine A had been carried out during the year; many of the diseases of the eye, the respiratory tract, the gastro-intestinal tract, and the urinary tract, were due to this deficiency; indeed this deficiency was especially characteristic of Indian diets, and underlay a vast amount of general disease in India as a whole. A new type of goitre—lymph-adenoid goitre—had been produced experimentally in rats; it was not associated with iodine deficiency; it was caused by toxins of microbic origin plus a deficiency in fat-soluble vitamines. Childhood goitre was a physiological rather than a pathological condition, and tended to disappear with sexual maturity; true endemic goitre on the other hand persisted till the menopause. A very large number of statistical data on goitre had been accumulated and now awaited analysis. A study had been undertaken of the iodine content of Himalayan waters and soils in goitrous and non-goitrous areas. The iodine excretion in the inhabitants of such areas was very low, whether they had goitre or not. An important side issue of his enquiries was the examination of normal standards of weight, etc., for different types of laboratory animals such as rats and pigeons. The publication of a small book on foodstuffs in India and diets had been followed by requests for permission to translate it for distribution into many different Indian vernaculars. The main conclusion which he had reached after a quarter of a century of work on the disease, was that goitre could be prevented by the administration of intestinal antiseptics. With regard to experimental animals he had a stock of about 1,000 rats, and with due attention to their feeding, hygiene, and comfort, there was no mortality, whilst normal litters were born with no infant mortality. (Considerable laughter and applause.) To sum up, the

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lesson of the whole of his work was that faulty and defective diets constituted the underlying principle of most of the great diseases in the tropics, the faulty diets leading to faulty cell metabolism and increased liability to disease. He asked for a continuation of his enquiries at a cost of Rs. 1,33,977 during the next financial year.

The president commented on the extreme value of Colonel McCarrison's work to India and to the world in general. What gave rise to anxiety was who was to replace Colonel McCarrison in this work when he retired. It was essential in the interests of India that this investigation should be continued. A member of the Conference said that Colonel McCarrison's investigations had opened up a new era in scientific medicine, comparable to the laying down of the foundations of bacteriology by Pasteur. The Conference agreed unanimously with regard to the absolute necessity of carrying on Colonel McCarrison's work at Coonoor.

Two subsidiary enquiries proposed by Dr. Niyogi of the Seth G. S. Medical College, Bombay—one into the nutritional value of different Indian vegetable foodstuffs, and the other a systematic survey of the different dietaries of different races and castes in Bombay—were then considered; it was decided to refer both for decision to the Scientific Advisory Board.

Maternity and child welfare.

These subjects came up next for discussion. Dr. Dagmar Curjel Wilson gave an outline of the results of her enquiry into osteomalacia, which is now being closed down. (We published Dr. Wilson's final report on this work in our February issue.) In its place, Dr. Wilson suggested for next year an enquiry into the causes of infant mortality and morbidity in India; it was proposed to run this enquiry in two selected areas in the Punjab, one urban and the other rural, studying in the first instance the causes of death among children aged 0—2 years, later, of children aged 2—5 years. At present the infant mortality in India was terrible, but there had been no systematic or scientific enquiry into the factors underlying and causing it. The Conference was unanimously in favour of the setting up of this important enquiry. (The estimated cost is only Rs. 6,000 a year.)

Certain minor enquiries in the same connection were next considered. Dr. V. R. Khanolkar, Professor of Pathology at the Seth G. S. Medical College, Bombay, proposed to continue his observations on the hæmoglobin index in pregnant women, both in those in normal health and in those suffering from the anæmia of pregnancy. Dr. H. D'Sa of the same institution wished to continue to collect data with reference to the causation of fœtal and maternal dystocia in India. With reference to this latter enquiry, at present there exist no records of pelvic and fœtal measurements for women and fœtuses of the many different races and castes of India, and Bombay is a city in which it is possible to accumulate such data with reference to a very wide diversity of such races and castes. The Conference referred both enquiries to the Scientific Advisory Board.

Dr. Lucy Wills then gave an outline of the results of the enquiry by herself and Dr. Margaret Balfour into maternal mortality and morbidity in India. Every attempt had been made to find out whether any special microbic infection was responsible for the well-known anæmia of pregnancy in India; results had been completely negative. A study of premature births from a dietetic point of view had shown that there was a special association between premature birth and a deficiency of vitamine B in the mother's diet. Osteomalacia, as studied in Bombay, had a special association with a low phosphorus content, and rapid improvement could be brought about by treatment with ultra-violet light. Dr. Balfour's report on maternity conditions amongst industrial women workers in the Bombay mills had been published in the *Indian Medical Gazette* (May 1930, p. 241); and her report on early infant mortality in India with special reference to premature birth, in the same journal (November 1930, p. 630). Data were being collected with regard to the causes of stillbirth in India. Dr. Wills herself is leaving India next February, but she suggested that either a small sum should be provided for the continuance of Dr. Margaret Balfour's part-time investigations, or, better still, that a whole-time research worker should be obtained to carry on the full investigations. The anæmia of pregnancy so characteristic of obstetric work in India could probably be better investigated at the Eden Hospital in Calcutta, with the associated laboratories at the Calcutta School of Tropical Medicine, than in Bombay where much time was wasted in travelling between the hospitals and the laboratory. Colonel Green-Armytage and Colonel Acton had both promised facilities.

This suggestion gave rise to a considerable discussion. A member stated that this enquiry by Dr. Balfour and Dr. Wills was of the utmost importance in view of the terrible maternal mortality rate in India. He thought that there was just as much clinical material available in Bombay as in Calcutta. The question for decision was whether to carry on Dr. Balfour's collection of data with a small grant, or to fully organise the work under a new worker, studying the therapy and treatment of the anæmia of pregnancy, its relationship to dietetic deficiencies and the reticulo-endothelial system, and carrying out animal experiments. The Conference finally decided to refer the matter for decision to the Scientific Advisory Board.

Leprosy.

Dr. E. Muir asked for three grants totalling Rs. 13,412 for the continuation of his work on leprosy at the Calcutta School of Tropical Medicine. The erythrocyte sedimentation test had proved of great value in testing the resistance of patients to the disease, and as an index of the value of different therapeutic measures. Pyorrhœa had been found to complicate most cases of leprosy and treatment of this condition improved the patient's general health, and lowered the sedimentation rate. The leprous lesions were now treated by intradermal infiltration with hydnocarpus esters. During 1929 the number of new cases attending the clinic was 1,131; of these 180 were cases of diseases other than leprosy—and included 14 cases of dermal leishmaniasis. Of 429 early cases treated during the year 9 per cent. lost all active signs of the disease. A large number of drugs had been tested, but none yielded as good results as the hydnocarpus esters. He had failed to confirm Shiga's cultivation of the leprosy bacillus *in vitro*. Flocculation tests on the serum in leprosy had been carried out. Dr. J. M. Henderson had carried out a complete survey of all the literature dealing with the bacteriology and pathology of leprosy during the last thirty years, and had incorporated the results in a memoir with a bibliography of 220 references. Surveys had shown a leprosy incidence of from 0.8 to 6.2 per cent. among labour forces in different parts of India. The chemical work on oils and ethyl esters had been continued during the year.

The Conference agreed to these grants.

Respiratory diseases.

The consideration of this important subject opened amicably and ended in an extremely vigorous but very important discussion. Dr. M. B. Soparkar asked for a grant of Rs. 45,340 for the continuance of his tuberculosis enquiry. Contrary to what is the case in Europe, he had found that all cases of surgical tuberculosis in India were due to infections with the human strain of the tubercle bacillus; one case, however, had proved to be of bovine origin, and another of avian origin. Working at Ferozepore and at Lahore on cattle, an amazing and entirely unsuspected state of affairs had been discovered; from 21 to 31 per cent. cows, bullocks and buffaloes had been found to be infected with tuberculosis; these infections were with the bovine strain with one exception, where the infection was with the human strain. The supposed immunity of Indian cattle to tuberculosis was a myth; they were more

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heavily infected than cattle in Europe. (What prevents the almost universal tuberculosis infection in childhood which occurs in Europe is presumably the fact that all milk drunk in India is boiled first.) There had also been an outbreak of tuberculosis among the sambhurs in the Zoological Gardens in Bombay, the strain being of bovine type. Experiments designed to test whether there is a filterable and ultra-microscopic stage in the life history of the bacillus of tuberculosis had all had completely negative results. Spontaneous tuberculosis in laboratory animals had been studied, and tests carried out as to the immunising value of B. C. G. in cattle. An examination of school children by the von Pirquet test in Ferozepore and Amritsar had revealed an unexpected number of positive results—49 per cent.

In the discussion on Dr. Soparkar's proposals a member from Madras said that examination of the cattle in the *pinjrapoles** in Madras had shown a heavy incidence of spontaneous tuberculosis in cattle. No less than 23 per cent. of the cattle stock maintained by the Madras municipality had given positive results to the von Pirquet test.

Various workers strongly supported the inquiry. Several members of the Conference dwelt on the importance of tuberculosis in Assam, Bombay, the Punjab and Bengal. One member made the useful suggestion that, as this appeared to be a matter of agricultural importance, the Imperial Council of Agricultural Research might be asked to consider the cost of the inquiry.

Dr. A. C. Ukil then asked for a continuation of his tuberculosis enquiry, at a cost of Rs. 12,000. Results of some 6,500 von Pirquet tests in children and of 1,000 consecutive unselected post-mortem examinations had shown that there is extremely little "bacillization" of children in India with the tubercle bacillus. In the adult, absence of immunity, and—especially—the secondary bacterial infections associated with pulmonary tuberculosis, led to the disease being a very fatal one. Work had also been carried out on typing the strains of tubercle bacilli from human cases, and on the innocuousness or otherwise of Calmette's B. C. G.

Lieutenant-Colonel H. W. Acton, I.M.S., next asked for a continuation of the grant of Rs. 4,760 for Dr. Dharmendra to continue his work on the morbid histology of the bronchial lymphatic glands in tuberculous infection in cattle. Briefly, Dr. Dharmendra's findings are that inhalation of foreign particles, particularly of silica and carbon, lead to hypertrophy and fibrosis of these glands, with an increased susceptibility to tubercular infection. Dr. Dharmendra is also studying the possibility of improving methods for the cultivation of the tubercle bacillus, and its isolation from very early cases of pulmonary tuberculosis.

After discussion, the Conference referred all three proposals to the Scientific Advisory Board for opinion.

At a later stage of the meeting Lieutenant-Colonel H. W. Acton, I.M.S., put forward proposals for a new enquiry into respiratory diseases in general in India. The budget proposals for this enquiry—based on the Calcutta School of Tropical Medicine—were for a sum of Rs. 32,540, with one whole-time research worker on a salary of Rs. 1,750 per mensem in charge of it. Colonel Acton suggested that the following investigations should be taken up: (*i*) the effect of protozoal and helminthic infections of the lung tissue in lowering its defence mechanism against disease; (*ii*) to type the strains of pneumococci occurring in India and to study the possibilities of serum treatment of pneumonia in India; (*iii*) a study of the micro-organisms associated with nasal catarrh in India; (*iv*) to study the diagnosis of early cases of (closed) pulmonary tuberculosis by *x*-ray and cultural methods; (*v*) to study the clinical syndrome known as asthma; and (*vi*) to study the effects of treatment with very minute doses of tuberculin on early cases of glandular and closed pulmonary tuberculosis.

The putting forward of these proposals immediately led to the most important discussion which occurred at the Conference. The Director of the Nutritional Enquiry strongly supported the proposals. Here the importance of dietetic deficiencies came in; a statistical enquiry in East Africa on 120,000 persons had shown that 41 per cent. of those on a defective diet developed respiratory diseases, as against 6 per cent. of those on a satisfactory diet. Another member considered that the subject raised was an immense one; he supported the enquiry but suggested that it be limited to the three first items enumerated. A Bengal member said that a beginning should be made on the study of respiratory diseases in India; pneumonia was one of the chief causes of death in India, and was often associated with malaria. A Bombay member said that he would like to see a Respiratory Diseases Commission appointed, analogous to the Kala-azar Commission, with a full staff and a wide programme. Other views expressed were, that funds were limited, that respiratory diseases were often secondary to other infections, and that what must be considered was the feasibility of a proposed enquiry rather than its advisability. The Secretary, I. R. F. A., said that the League of Nations Singapore Bureau had already been considering the possibility of an international enquiry into pneumonia by an expert committee, and had had its staff collecting the existing information and drawing up a bibliography*. He suggested that the scope of the proposed enquiry should be narrowed. Major Malone drew attention to the fact that he had worked for two years on the types of pneumococci in India; they corresponded in general with those in other countries. The President pointed out that the proposed enquiry would mould itself according to (*i*) the clinical material available, and (*ii*) the character and abilities of the special worker employed. A preliminary survey of the whole subject was first indicated. A reference to the "priority list" of diseases for investigation, drawn up at a previous similar conference, showed that respiratory diseases were not even specifically mentioned in that list. Many speakers in turn considered the programme too ambitious for a single worker.

At this stage a member proposed that the Conference pass the following resolution:—"That this Conference, recognising that respiratory diseases are the chief cause of mortality in the statistical returns for India, recommends that adequate provision for investigation into these diseases should be made by the Indian Research Fund Association." Half a dozen other resolutions were immediately proposed by different members. The President called the meeting to order and asked for a definite vote for or against Colonel Acton's proposed enquiry; this resulted in a majority of votes against it, several members not voting. The President then commented on the fact that the adverse vote had come from many of the most important members of the Conference; there was clearly a difference of opinion, and he would like the Conference to give him a lead as to what policy he should advise the Government of India to follow in this very important matter.

Other members commented on the immensity of the subject under discussion and the necessity for drawing up a programme. Respiratory diseases were the chief cause of mortality in India, but that fact was no reason why they should not start an enquiry into the subject in a small way. Several other speakers followed, and finally a general resolution was passed by the Conference in full plenary session (*vide* p. 345). The decision as to Colonel Acton's proposed enquiry was left to the Scientific Advisory Board.

* Homes for sick and aged cattle.

* An excellent memoir since published by the Director of the Eastern Bureau (Dr. Gantur) was considered by the Advisory Council of the Bureau on December 27th, 29th, 30th, 1930.

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Malaria.

The report of the sub-committee on malaria now being available, the Conference proceeded to discuss the proposals for research work on this disease.

Major J. A. Sinton, V.C., O.B.E., I.M.S., Director, Malaria Survey of India, reported that the training of the malaria classes at Karnal had been extended from one month to six weeks. Three papers had been published dealing with the treatment of malaria, the last (*Indian Med. Gaz.*, November 1930, p. 603) being a summary of his work during the last nine years. A method for staining malaria parasites by an iron hæmatoxylin stain had been worked out, and chemical studies undertaken into the absorption and diffusion of quinine in living cells. Surveys had been carried out in Delhi and Vizagapatam. Captain Barraud had continued his systematic work on the anophelines and culicines of India. Three issues of the new *Records of the Malaria Survey of India* had been published, and a fourth was ready for press. Requests from all over India for advice, assistance, and the loan of literature had been complied with.

The sub-committee had considered in the first place the proposed programme of the Malaria Survey of India for 1931-32, the budget provision for which was Rs. 2,44,645, and had approved of it. They considered that there was a need for a permanent central malaria committee, to meet at least once annually and review all central and provincial anti-malaria work. A similar committee should also be constituted for each province. There was also need for international contact with the Malaria Commission of the League of Nations. Government should take measures to popularise the sale and distribution of quinine.

It was decided that the Sind Malaria Enquiry should be continued; this enquiry is of importance since it deals with the influence of irrigation on malaria; conditions prior to the opening of the Sukkur Barrage have been thoroughly investigated, and the results of the opening of this vast field of irrigation will now be studied. Dr. R. Row had been studying the production of antibodies in the plasma in malaria, and the general serology of the disease; it was decided that his enquiry should continue. Other enquiries, the continuance of which it was decided were advisable, were the clinical studies in malaria by Lieut.-Col. T. A. Hughes, I.M.S., Dr. I. M. Puri's enquiry into the Indian simulidæ, culicoides, and other blood-sucking midges, a new proposal by Dr. V. R. Khanolkar of Bombay for a study of methods of culture of human parasitic protozoa, and the work of the malaria treatment centre at Kasauli.

In commenting on these enquiries one member stressed the necessity for differentiating between basic malaria research and routine malaria survey; research workers should be kept for research work. A member emphasised the need for malaria engineers in India; only too often surveys were carried out, recommendations made, and then nothing was done about it. Dr. Bentley said that too many provinces had no policy at all with regard to malaria; the last official resolution with regard to the disease by the Government of Bengal was dated 1907. A member referred to the resolution at the previous year's Conference with regard to the necessity for malaria engineers. Another member pointed out that the existing public health committees in several provinces could well take the place of the proposed provincial malaria committees.

Lieutenant-Colonel R. Knowles, I.M.S., then proposed a new enquiry by himself and Mr. R. Senior-White into the limiting values of atmospheric temperature and humidity on the transmission of malaria by different species of Indian anopheles—at an estimated cost of Rs. 18,888. He pointed out the great importance of obtaining knowledge on this matter. At present every malaria worker in the tropics was relying on the values laid down by Jancsó in his very brief paper of 1904, on *Anophelis 'claviger'* in Rumania. It was quite unsafe to generalise for the whole of the tropics from a small piece of work carried out in Europe twenty-six years ago. Colonels King and Hodgson had worked at the subject to some extent. Colonel Gill had published two valuable papers. The recent papers of Bruce Mayne suggested that Jancsó's values for Europe were completely wrong for India; he had not found transmission to occur at Saharanpur until almost saturation humidity was reached. At present it was generally held, in view of Jancsó's work, that transmission only occurred between 17.5 and 26°C., and that humidity was only of importance in facilitating survival of the female anopheles for a period sufficiently long for transmission to occur.

The initial difficulty would be to devise apparatus in which both temperature and humidity could be separately controlled. Once this was overcome the second step would be to study the effects of different temperatures and humidities on the length of life of the mosquito. When that had been worked out, he proposed to take the Indian transmitting species one by one, and to carry out the following preliminary experiments:—

(*a*) Using a constant humidity of 100 per cent. to evaluate the temperature factor at 10°F. intervals from 50 to 100°F.

(*b*) Using a constant temperature, e.g., the average rains' 8 a.m. reading for the stations at which the species under experiment is the chief local carrier, to evaluate the humidity factor in 10 per cent. intervals from 50 to 100 per cent.

The enquiry would last some years. The Railway Board had kindly agreed that Mr. Senior-White could devote attention to it in the field, with one field entomologist and two field assistants. Mr. Senior-White's services would cost the Research Fund Association nothing. The basic laboratory work would be carried out at the Calcutta School of Tropical Medicine.

Various members spoke in strong support of the proposed new enquiry. Reference was made to the preliminary work that Colonel King and Colonel Hodgson had carried out in this connection. The malaria sub-committee had recommended the new enquiry to the Scientific Advisory Board "for favourable consideration," and to this the Conference agreed.

Sprue.

Colonel Mackie asked for the continuance of a small grant of Rs. 5,400 for the work on sprue at the Haffkine Institute, Bombay. He hoped during next year to bring this enquiry to a conclusion, and to publish his final results. The Conference agreed.

Helminthology.

Dr. V. T. Korke described his work on filariasis in Bihar and Orissa. The incidence of the disease was highest in the sea-coast belt, high in the Gangetic plain, and lowest in the sub-montane arable area. *Culex fatigans* alone had been incriminated as the vector, and maximal infection of this mosquito was reached in the months of June and July. Cement drains were especially dangerous, and the whole question of prophylaxis against the disease turned upon a campaign against the mosquito vector.

This enquiry had been transferred to Kasauli in June 1930, and Dr. Korke now proposed to take up a systematic investigation of the Indian Trematoda. Work on the cestodes and the nematodes had been fairly well carried out in India, but our knowledge of the Indian trematodes was at present very scanty and the subject required full investigation. The Conference agreed.

Dr. P. A. Maplestone then reported on his enquiry into the seasonal variations in hookworm infection. It takes about six weeks to two months for the worms to commence egg-laying after they have gained entrance to the body, and the high maximal counts in July and August indicate that there is considerable acquisition of worms during the earlier part of the

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rains; once the rains are well established, this ceases, and there is a fall in September in consequence—this fall probably continuing from October to December. He now proposed to close down this enquiry, but asked for a grant to commence a new enquiry. He wished to study the pathological effects of different helminthic infections on the human host; for example ascaris and ankylostoma infections might cause serious damage to the lungs. We are at present profoundly ignorant of the possible toxins produced by worms, and their effects on the host. It would be necessary to breed clean worm-free animals, and for this purpose he asked for a grant to build a small animal house of light structure on the roof of the Calcutta School of Tropical Medicine. The Conference agreed to recommend that this enquiry be carried out.

Colonel Acton next commented on the work of Dr. Sundar Rao (who was absent on leave) in connection with filariasis. (Much of this work has been published in our columns, and our readers are already familiar with it.) The ætiology and pathogenesis of infection with *F. bancrofti* have been worked out, as well as the mode of causation of the different lesions in filariasis. The importance of focal sepsis plus lymphatic blockage by worms injected by the mosquito and travelling towards the deeper lymphatic channels had been shown, and he and Dr. Sundar Rao had shown how to deal with this condition by autogenous vaccines and local measures. What was now most urgently needed was to find some drug which would be absorbed by the lymphatic system and would kill the parent worms in the deep lymphatics. He asked for a grant of Rs. 4,712 in the next financial year, and the Conference supported this.

Pharmacology.

Colonel Acton—in the absence of Lieutenant-Colonel R. N. Chopra, I.M.S., on the Indian Drugs Enquiry Committee—next outlined Colonel Chopra's work during the year on the Indigenous Drugs Enquiry. The pharmacological actions of cinchonine and cinchonidine had been fully studied in view of their extensive use in cinchona febrifuge. The stability of the alkaloids of kurchi bark (*Holarrhena antidysenterica*) had been investigated. Analysis of the alkaloidal content of the Indian species of Ephedra had shown that it is highest in October and November, after which it declines. It had been found that pseudo-ephedrine could often be used for asthma, heart failure, etc., in place of ephedrine. The action of the active principles of *kuth* root (*Saussurea lappa*) had been studied. At present five drugs in the British Pharmacopœia were under study with a view to their production from Indian sources, and seven further drugs used in the indigenous systems of medicine were under investigation. A big programme of work lay ahead and it was essential that the enquiry should be continued. The enquiry was strongly supported by two speakers, one of whom paid a tribute to Colonel Chopra's pioneer work in this important subject. The Conference cordially supported the continuance of the enquiry.

Colonel Acton next dealt with Colonel Chopra's Drug Addiction Enquiry. The cocaine habit in India has been exhaustively studied during the last three years; it is of comparatively recent importation into India and has spread from Calcutta into the United Provinces, the Punjab and the N.-W. F. Province. Japan is now the chief source of supply. Cocaine is usually taken with betel leaf, and there are from half to one million users now in India. A careful clinical study had been made of 200 addicts, and the results were being prepared for publication. In 1931-32 it was proposed to take up the subject of addiction to Indian hemp, to study the relative effects of opium eating and smoking, and the effects of the administration of opium to infants. Several members spoke of the necessity for the continuance of this enquiry, one speaker pointing out that if the Madras Government could find 3 lakhs a year for the cause of temperance, the different provincial governments in India might well find some money to support Colonel Chopra's valuable investigation into addiction to other drugs. The work was of value to the Excise Department.

Skin Diseases Enquiry.

Colonel Acton next dealt with this subject. The chief work of the year had been the investigation of actinomycotic lesions of the skin. (We have published a paper by Colonel Acton and Dr. McGuire on this subject in our issue for February 1931.) The organisms from the lesions are readily demonstrated by the use of McGuire's modification of Ponder's stain, and cultures have been obtained by using Subrahmanyan and Norris's medium for soil actinomyces. Studies on ringworm have been continued throughout the year, but no asci have ever been found to be produced by these organisms. In certain cases of chronic diarrhœa with mucus in the stool and Charcot-Leyden crystals but no *Entamœba histolytica*, an actinomycotic infection has been found, and these cases rapidly improve on treatment with potassium iodide; the actinomycotic infection appears to be secondary, following on a primary amœbic one. A similar state of affairs may occur in oriental sore. A special study has been carried out during the year on the rôle of the reticulo-endothelial system in connection with kala-azar and dermal leishmaniasis. During next year Colonel Acton proposed to continue his enquiries into the hypertrophies of the skin. The Conference agreed to recommend this enquiry.

Diabetes Enquiry.

Dr. J. P. Bose gave an account of his enquiry during the year. A special study had been made of the action of antimony compounds on the suprarenal function in cases of kala-azar and chloasma associated with increased pigmentation of the skin. In these cases it was found that antimony increases this function, and that the patients' susceptibility to insulin becomes very much less. Conversely the injection of emetine lowers suprarenal activity, and this may lead to cure in cases of leucoderma. The experiments outlined opened up a new and most promising line of work, for if suprarenal activity and the activity of other endocrine glands could be regulated as desired, important advances in therapeutics might follow. The Director of the School of Tropical Medicine supported Dr. Bose's proposals for a continuance of his enquiry, and said that he and Dr. Bose proposed next to investigate the rôle of the pituitary. Dr. Napier spoke of the value of Dr. Bose's work to his kala-azar enquiry. The Conference agreed to recommend this enquiry.

Blood Proteins Enquiry.

In the absence of Colonel Lloyd on leave, Colonel Acton dealt with this enquiry. Colonel Lloyd's work had shown that the relationship of the serum albumins to the serum globulins in kala-azar varied very widely from the normal, but that under antimony treatment there was a rapid return towards normal; once the return to normal set in the patient became cured whether any more antimony was administered or not. A similar but less well marked change occurred in malaria and in typhoid fever. At present Colonel Lloyd had begun to collect similar observations in cases of syphilis, and he proposed to carry on this work. The grant asked for—Rs. 4,525—was chiefly for the pay of a biochemical assistant. A member very strongly supported this enquiry and pointed out that at present we were profoundly ignorant with regard to the subject of immunity in protozoal and spirochætal infections, and that Colonel Lloyd's work appeared to be going to demonstrate the chemical basis underlying such immunity. Another member also strongly supported the enquiry, and the Conference agreed.

At this stage of the proceedings, pending the receipt of the reports of the special sub-committees, several proposals for minor researches were considered. These may be dealt with very briefly. Major Bhatia, I.M.S., proposed to continue his enquiry into the secretion and

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composition of the gastric juice in different races and castes in India. Two members were in support, and another pointed out that in kala-azar, and to some extent in malaria, achlorhydria was usually present, and this might have a bearing on the possible oral transmission of kala-azar. Dr. Kurulkar of the Seth G. S. Medical College, Bombay, proposed an anthropometric enquiry in Bombay; the population of Bombay city is an exceedingly mixed one, and he proposed to take the measurements of 1,000 persons in order to determine normal standards for the different races and castes of India. A member supported the enquiry, but another stated that in his opinion such a purely anthropological enquiry should be paid for by the central or provincial governments; it was hardly a fair charge on the Indian Research Fund Association.

Spirochætosis Enquiries.

Lieutenant-Colonel R. Knowles, I.M.S., explained the position with regard to the spirochætosis transmission enquiry. He proposed to close this down at the end of the present financial year, when it would have lasted for four years. The essentials of the problem had been garnered. During the year the mechanism of the crisis in avian spirochætosis had been very carefully studied, as well as the production of lysins in the plasma. The disease had also been especially studied in the pigeon, which bird was much less susceptible than fowls. A naturally-occurring blood-inhabiting spirochæte of the guinea-pig had been discovered. There were five or six transitory references to this spirochæte in the literature, but no full account of it. It was a spirochæte typical of the relapsing fever group, and morphologically extremely like *S. anserina*. In *Argas persicus* this spirochæte underwent exactly the same evolution as *S. anserina, tenue* forms appearing in the cœlomic fluid about the fifth day, and the salivary glands being invaded later. Although the two spirochætes were thus very similar, there was a profound biological difference between them; the fowl spirochæte would only take in birds, and not in monkeys, rabbits, guinea-pigs, rats, mice, geckoes, toads, frogs, and fish; on the other hand the guinea-pig spirochæte would take in small mammals but not at all in birds. As both spirochætes invaded the salivary glands of *Argas persicus* he next proposed to feed argas infected with the guinea-pig spirochæte on fowls, and argas infected with the fowl spirochæte on guinea-pigs, to see whether this profound biological difference did or did not persist during transmission through the insect vector. The course of avian spirochætosis in inoculated hen's eggs had been studied; unfertilized eggs would not take, and the spirochæte required the presence of living tissue. Appearances exactly resembling Balfour's granules in the after-phase could be brought about by daily injection of phenylhydrazine into clean birds. Four months of the year had been devoted to an exhaustive study of the literature and 180 papers had been read—mostly in the original; as a result an essay-review of the whole of the previous literature, 120 pp. of MS., had been written. It now remained to prepare the results of the four years' investigations in memoir form for publication.

Colonel Jolly next referred to Colonel Taylor's work on leptospirosis in Rangoon and the Andamans. A five months' survey of the Andamans had brought no less than 64 cases of Weil's disease to light, and the Andamans' leptospiræ had been typed serologically. They fell into two groups, which showed no cross agglutination, one coming from cases of every degree of severity, the other from mild cases only and apparently related to Fletcher's Akiyami A group. A curative serum had been prepared in England from the first strain, and this serum protected guinea-pigs when given in doses of 0.25 c.c. Investigations had been carried out on the survival of leptospiræ under different pH conditions, and on the action of chemicals and fertilizers on them. Leptospiræ were found in all waters in the Andamans with a pH of over 6.9. A comprehensive report had been prepared on the enquiry in the Andamans and the subsequent investigations, and to this had been added an extensive appendix on our present knowledge of leptospiral diseases. This was now in press as Memoir No. 20 of the *Indian Medical Research Memoir Series*. The enquiry would therefore close down, but a small sum of Rs. 500 was asked for for the purchase of serum. The combination of copper plus antiserum had been found to be very efficacious in experimental animals, and it was desired to try out the same combination therapeutically in man.

A number of miscellaneous proposals were next considered. Dr. Charles Reid of Patna explained his work on (*i*) blood diastase and (*ii*) the hyperglycæmia of anæsthesia. Variations in the blood-diastase-content of the same individual were found at different times, and the significance of this and its bearing on carbohydrate metabolism was not clear. Anæsthetics and injections of starch solutions increased the diastase content. In dogs pancreatectomy and ligature of the pancreatic duct were without much effect on the blood diastase. It appears that the main source of diastase in the blood is not the pancreas, nor is diastase entirely a waste product on its way to excretion by the kidney; the variations in diastase content are probably due to its being taken up or given out by the liver cells, etc., as required. The effect of full surgical anæsthesia by chloroform, ether, amytal, and intravenous alcohol, on the blood sugar of animals had been studied. Both ether and chloroform caused marked hyperglycæmia during anæsthesia and for some hours afterwards. He asked for a grant of Rs. 3,597 to continue this work. Two members spoke in support, and the Conference agreed.

A grant of Rs. 4,800 for an enquiry at the Haffkine Institute into the serological reactions of *B. avisepticus* was next considered and approved. Lieutenant-Colonel H. H. King, I.M.S., then asked for a small grant to obtain the services of a botanist to enquire into the fauna and flora of water-supplies in the Madras Presidency. Madras depends very largely upon impounded water-supplies in which algæ flourish and an investigation of these algæ and their allies was called for. The results of such a survey would be of interest to all-India as well as to Madras. This proposal led to some criticism. One member said that the money should come from the local government, and that a large volume of work of this type had been carried out in the United Provinces and elsewhere. A member said that in Bengal they had been carrying on such work for many years, and that they looked upon it as routine rather than research. Another member said that if so much work had been done in Bengal and the U. P., he would appeal for the results to be published for the information of other workers. The matter was then left for the Scientific Advisory Board to deal with.

Two minor enquiries, to be carried out under Major Mallaya, I.M.S., Police Surgeon, Calcutta, were next proposed by Colonel Goil, Principal of the Calcutta Medical College. The first was to collect radiological data with regard to the determination of age in children and minors; the second, to appoint a lady doctor to go round the girls' schools in Calcutta to collect data on the teeth, height, weight, etc., of girls of known age. Under the Sarda Act the determination of the precise age of girls between 12 and 16 years had become very important, and such data should be collected. The Conference agreed to both proposals.

Rabies.

The report of the rabies sub-committee was then read. Colonel Morison gave an account of the investigations carried out at the Pasteur Institute of India by Major A. C. Craighead, I.M.S. The total hydrophobia

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rates with different lines of treatment had been as follows:—

Class of case.	Total treated.	Vaccine.	Total hydrophobia rate.
Class III	1,586	5% carbolised	0.95%
	1,600	5% etherised and carbolised.	1.62%
	1,598	Alivisatos'	1.00%
Class IV	1,105	5% carbolised	4.25%
	1,106	5% etherised and carbolised.	6.51%
	818	Alivisatos'	4.88%

In experiments with street virus the lowest mortality had been obtained by the use of a 5 per cent. carbolised vaccine prepared from the Paris fixed virus.

The sub-committee recommended a continuance of the enquiry, and the Conference agreed.

Cholera and Bacteriophage.

The report of the cholera sub-committee being now available it was read out by Colonel Mackie (*vide* resolutions). The previous enquiries by Dr. Khan, by Dr. Tomb at Asansol, and under the Director of Public Health, Bengal, had been closed down. Colonel Morison had examined the 74 strains of vibrio isolated in these and other enquiries and had completely failed to convert agglutinating into non-agglutinating strains. Colonel Gill gave extracts from an unpublished paper by himself and Dr. Lall on investigations of cholera epidemics during six years in the Punjab. These epidemics proved to be of two types: (*i*) explosive outbreaks where a large number of cases occurred within 24 hours of the arrival of an infective individual; these are definitely associated with infected water supplies, but comprised only 2.7 per cent. of the 3,315 outbreaks studied; (*ii*) outbreaks of a different type. In these, after the arrival of the infective agent, one week elapsed with no case; during the second week there were a few cases; then followed an epidemic with a definite curve. These epidemics attack individuals in *houses* and not families, and are similar to outbreaks of bubonic plague. Water contamination failed to account for them. Flies had been studied in this connection; it had been found that the cholera vibrio disappeared from the intestine of fed flies within 24 hours after the feed, but then re-appeared on the 5th day. This phenomenon was still under investigation.

Dr. Asheshov then gave an account of his work during the year at Patna on cholera bacteriophage, which he proposed to continue next year at a cost of Rs. 72,066. He dealt first with the theoretical principles underlying bacteriophage action. The virulence of a given strain of 'phage depended on (*i*) the individual character of the bacteriophage race, and (*ii*) the characters of the vibrio on which the 'phage was cultivated. The primary A, B and C strains of cholera 'phage could again be subdivided; and there were good and bad strains of vibrio from the point of view of 'phage production. Thus from strain A 'phage he had isolated the following strains:—

Cholera 'phages.	Groups of vibrios. I.	II.	III.	IV.
61 A.	+	—	—	—
62 A.	+	+	—	—
63 A.	+	+	+	—
64 A.	+	+	+	+

He regarded the different types of 'phage as equivalent to different species, differing entirely from one another in antigenic characters. It had taken him two and a half years' work to elaborate strain 64 A, and he had not encountered any similar strain in Nature. For the propagation of 'phage freshly isolated vibrio strains must be used, and must be carefully chosen so that the virulence of the 'phage is not damaged. Bacteriophage-production was not a matter which could be undertaken by anyone working in a laboratory; it could only be done by specialists who had devoted months and years to the study of the problem. 'Phage 64 A was administered to a patient with cholera, who completely recovered, and strain 64 A was subsequently recovered from the stools of other patients, showing that this strain was capable of propagating itself in Nature. A bacteriophage used for therapeutic and prophylactic purposes must contain all three types, A, B, and C; its type A must be active against all four groups of vibrios; whilst the B and C strains in it must be sufficiently active to prevent the appearance of secondary resistant growths, and to destroy in the shortest possible time the rough organisms naturally resistant to type A 'phage. Dr. Asheshov then described the methods which he now uses for 'phage production on a large scale; his laboratory was now in a position to produce 7.5 litres of 'phage a day, and even more, if more was required.

During the Car Festival at Puri when some 21,000 pilgrims visit the town, the town was divided into two halves; in one half 130 wells were treated with 'phage, the other half of the town serving as an untreated control. In the untreated area 25 cases of cholera occurred; in the treated area, 8 cases; of these 8 cases, 2 occurred in a house where the well had been overlooked and had not been treated. The railway station well was also treated, and no cases occurred in this area.

Work had been begun on the study of dysentery bacteriophage; at least 8 different types of 'phage were present, and this problem was an even more complicated one than the study of cholera 'phage.

Lieutenant-Colonel J. Morison, I.M.S., then gave an account of his work on bacteriophage in Assam. He had confirmed the existence of the three types of 'phage mentioned by Dr. Asheshov, and agreed that they could not be converted into one another. Some types of 'phage are much more stable than others. The Pasteur Institute at Shillong was now turning out polyvalent 'phage on a very large scale; they could supply all India if necessary, and 'phage treatment was now in universal use throughout the tea gardens of Assam. The earlier in an outbreak patients were treated, the better, as this allowed time for the 'phage to disseminate itself. Nowgong in Assam was notorious for its cholera, every year they had a virulent outbreak; and inoculation against cholera had completely failed to check these outbreaks. By the use of 'phage, however, cholera had been virtually abolished in Nowgong by 1930. The Kalang river was also notorious for the occurrence of cholera in the villages on its banks; 'phage was distributed to the headmen in these villages, and, now, for the third year in succession there had been no cholera.

Major Malone next asked for a small grant of Rs. 500 to complete Colonel Taylor's enquiry at Rangoon. During the last year the number of cases of cholera in Rangoon was very small, and they had only had limited opportunities of testing 'phage therapeutically. They had observed no beneficial effect, however, from the administration of 'phage to patients; there was no correlation between the presence or absence of 'phage and the progress of the disease in the community; and bacteriophage was apparently not related to the disease. Dr. Asheshov supported the continuance of the enquiry, as he wanted all the available evidence both for and against 'phage. Major K. R. K. Iyengar, I.M.S., next gave an account of his work in Madras. Fifteen villages had been selected beforehand as ones which were likely to have an outbreak during the cholera season, and the water from 87 wells, 20 tanks and 4 channels was examined. No bacteriophage was found. Cholera, however, failed to appear, and the experiment had been discontinued.

Captain C. L. Pasricha, I.M.S., then gave an account of his work at the Calcutta School of Tropical Medicine. It had been abundantly demonstrated that an agglutinating cholera vibrio could become a non-agglutinating one; but the reverse change had not been demonstrated. He had found that, under the influence of bacteriophage,

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secondary colonies were produced from non-agglutinating strains, which agglutinated almost to the full titre of the serum. Very little importance should be attached to morphology, for a non-agglutinating vibrio under 'phage action may appear as a coccus. On the other hand the *B. pseudocarolinus* was probably only a dysentery bacillus modified by 'phage action.

These grants having been agreed to, the general proposals of the cholera sub-committee were thrown open to discussion. The President dwelt on the importance of cholera in India and on its international aspect; he strongly supported the creation of a Cholera Commission and did not think a sum of 2 lakhs too much for a first annual grant. One difficulty was to obtain suitable trained workers for such investigations. Cholera had to be considered in all its aspects, and not only from the bacteriophage point of view. A member said that the League of Nations had raised the question as to whether high titre anti-cholera serum could be produced on a large scale in India. It was wanted for purposes of diagnosis in the laboratories on the pilgrim routes to Mecca and elsewhere. The proposals of the sub-committee were then accepted by the Conference.

Plague.

Colonel F. P. Mackie next read the report by the plague sub-committee. Their terms of reference had been to report on the work done in India since the F. E. A. T. M. Congress at Calcutta in December 1927 on the programme for plague research outlined at that Conference. This came under eight different headings:—

(*i*) Rat and flea destruction. Colonel Gill in the Punjab had found HCN pumps the most efficient of all methods.

(*ii*) Species of fleas concerned in transmission. Here a great deal of work had been recently carried out in India. Dr. Goyle in the United Provinces had found that *X. cheopis* was a much more effective vector than *X. astia*, though both could carry. Webster and Chitré had found that *astia* could give rise to rat epizootics in Bombay. Colonel King had found in Madras that the dissemination of plague coincided with the distribution of *X. cheopis*. Briefly, plague was controlled by the climatic factors present and by the flea species in the locality.

(*iii*) Plague in northern Asia. This was being studied by other workers.

(*iv*) The rôle of grain and cotton in dissemination. Here Colonel King had found a very greatly increased prevalence of *X. cheopis* in cotton and grain godowns.

(*v*) The rôle of rodents other than rats. Here very little work had been done in India, though the ground squirrel was under suspicion. The history of plague in South Africa was of interest in this connection; it had been imported into ports from India and had there established itself in the rat population. Now, however, the disease was epizootic among the veldt rodents.

(*vi*) The problem of recrudescence. Dr. Goyle had come to the conclusion that the infection was carried over during the non-epidemic season by small epizootics in rats.

(*vii*) Rat and flea conditions in ports. Surveys were going on in Madras, Rangoon, Vizagapatam, and other ports.

(*viii*) Prophylaxis and therapeutics. This was dealt with in the Haffkine Institute Report which was communicated by Colonel Mackie. Since 1927 Dr. Naidu and his assistants had been working at the possibility of preparing a really efficient anti-plague serum. Rabbits were used, and a serum had been produced which saved 100 per cent. of all infected animals if administered within 24 hours of the injection of plague bacilli. Attempts were now being made to produce the serum on a large scale from buffaloes, and sufficient supplies should be in hand by next April to try out the value of the serum in man. "Bilivaccin" anti-plague vaccine, administered orally, had also been tried in animals; it appeared to have a certain degree of protective power; these experiments were being continued. Germanin had been found to have no germicidal power against *B. pestis in vitro*, but experiments were still being carried out with it *in vivo*. A comparative investigation of seven different species of pasteurella organisms was being made. Work had been continued on transmission by different flea species, and it was advisable to investigate the transmitting powers of *Pulex irritans*. With regard to the chemotherapy of plague, twelve possible halogeno-mercuriphenols had been synthesised and tested; this enquiry was still being pursued. Biological methods for the standardisation of Haffkine's plague-prophylactic were being worked out. Vaccines prepared from growth on agar had much less immunising power than vaccines from broth cultures. By reorganisation, the time required to produce and distribute the vaccine had been reduced from three months to six weeks. Colonel Mackie asked for a grant of Rs. 50,486 for next year to carry on the work. He would point out that the Bombay Government contributed very liberally to the work by providing full facilities at the Haffkine Institute.

The Director of Public Health, Punjab, commented on the great help which the speeding up of the vaccine production had given to the Punjab. The secretary pointed out that India had always taken the premier place in investigations into plague. The authorities in the Dutch East Indies had abandoned rat destruction in favour of a policy of constructing rat-proof houses. They also were doubtful about the value of anti-plague vaccine. Plague, however, was spontaneously dying out in those islands. The President dwelt on the great value to Government of the research work done on plague in India, but, despite the natural diminution of the disease, we are still not yet out of the wood. He also commented on the very satisfactory results of international co-operation in this matter. The sub-committee's report was then accepted, and will be forwarded to the Singapore Bureau of the League of Nations.

Lieutenant-Colonel G. G. Jolly, I.M.S., next gave an account of his rat-flea survey in Rangoon. *X. cheopis* has its main habitat in the populated parts of Rangoon, where it is present in a proportion of 23 per cent., but in the foreshore area where Burma's exports of rice and grain are stored, the proportion is only 5 per cent. The rats on the barges were more or less free from fleas. *Mus concolor*, which constituted 50 per cent. of the rat population of the town, was the chief plague rat in Burma.

Lieutenant-Colonel H. H. King, I.M.S., then gave an account of Dr. Pandit's rat-flea survey in the Madras Presidency. Plague occurs only in the *cheopis* areas, and shows a seasonal variation, the off season being much prolonged in the eastern half of the presidency. *X. cheopis* predominates in Mangalore and Calicut, and appears to be continually introduced into the non-endemic areas; in some of the latter it appears to have established itself. Cochin was completely free from both plague and *X. cheopis*, but at Vizagapatam 65 per cent. of the rat fleas were *X. cheopis* and conditions there would have to be watched. Down the east coast of the Madras Presidency, where plague but rarely occurs, it is a cold weather disease and associated with a high incidence of *X. astia*.

Major A. M. V. Hesterlow, I.M.S., next gave an account of his investigation into the recrudescence of plague in the Cumbum Valley of Madura district. Systematic and periodical examinations had been carried out in a group of infected villages within a radius of 10 miles around Cumbum throughout one complete cycle of infection and re-infection. *X. astia* and *X. cheopis* shared the flea population between them; the proportion being 50 : 50. The enquiry had not been running for very long and he asked for its continuance. This concluded the discussion of the detailed proposals.

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Resolutions.

At the final meeting on the 22nd, the following resolutions were then passed:—

Resolution 1.

The Conference resolved that a Cholera Commission should be formed to undertake the investigation and study of the whole subject of cholera in India. This should consist of a Director and at least three Assistant Directors. At its headquarters will be constituted a Cholera Bureau and a main laboratory. The location might be at any suitable locality in India, the necessary arrangements for a laboratory and a Bureau being made provisionally in such accommodation as may be available. It should also have field laboratories at such localities as may from time to time be decided on by the Director, Patna, however, being retained, to start with, as a base for work on bacteriophage.

This Commission should be appointed for five years in the first place and the Director should work towards the establishment of a good organisation of a semi-permanent kind, having in view the probability that research into cholera in India would in any case last for some years and require eventually a systematised epidemiological enquiry in many parts of the country. This Commission would work in very close touch with the Directors of Public Health of the provinces.

It was considered that a sum of two lakhs of rupees should be budgeted for the purpose of this Cholera Commission during the next financial year, this to include all enquiries on the subject of cholera bacteriophage.

Resolution 2.

(*i*) The Conference, having reviewed the progress of the Malaria Survey of India since its inception in 1926 to date, wishes to emphasise the need for the continuance of this work which is essential to malaria prevention in India.

(*ii*) The Conference further desires to express the need for the expansion of malaria work of this character, not only centrally but also provincially, by the strengthening of the malaria organisations under the provincial governments.

(*iii*) (*a*) The Conference is of opinion that there should be a permanent Central Malaria Committee, consisting of the Director-General, Indian Medical Service, the Public Health Commissioner with the Government of India, the Director of the Malaria Survey of India, the Director of Public Health of each province or his nominee, and a representative of the medical services under the Railway Board, to meet at least once annually to review all the work in connection with malaria done centrally and provincially and to make such representations to Government as may seem desirable, and that this Committee should have power to co-opt such additional members as may seem desirable from time to time.

(*b*) The Conference also recommends the formation similarly of a Provincial Malaria Committee to review work done in each of the provinces and to make representations to the local government concerned.

(*iv*) The Conference is of opinion that one of the first subjects to which the Central Malaria Committee should turn its attention is the drawing up of a general statement of malaria policy in India, the recommending of the lines on which provincial organisations for the study of malaria should be formed, and the means of liaison between these and the Central Malaria Research Organisation.

(*v*) In regard to international aspects of malaria work the Conference considers that there should be as complete co-operation as possible between the Indian organisation and the Malaria Commission of the League of Nations working in Europe and elsewhere.

(*vi*) The Conference recommends that Government be asked to consider measures for popularising the use of quinine.

Resolution 3.

The Conference, recognising that respiratory diseases are among the chief causes of mortality in India, considers that an enquiry into these should be taken up as soon as possible and that this subject should be considered when the next Conference meets.

Resolution 4.

The Conference resolved that an expression of its thanks for the continuance of the grant for medical research be transmitted to the Government of India. It desired to emphasise once again the necessity for the continuance of this grant and the probability of the need for its increase in future.

Resolution 5.

The Conference wishes to bring to the notice of the Government of India the facilities which have been afforded by the Bihar and Orissa Government for the prosecution of the Bacteriophage Enquiry now based on Patna, and requests that its thanks be transmitted by the Government of India to the Government of Bihar and Orissa. It expresses the hope that these facilities may continue to be afforded in the future as in the past.

Resolution 6.

This Conference of Research Workers in the field of medical science, being deeply sensible of the great distinction which Professor Raman's services to physical science have rendered to scientific research in India, desires to convey to him its congratulations on the award to him of the Nobel Prize for physics.

Resolution 7.

The Conference recommends that the question of holding the annual Conference of Medical Research Workers at other centres than Calcutta should be considered.

In closing the Conference, the President commented on the business-like way in which it had gone through. The plan of having all reports written out and circulated beforehand had saved a great deal of time. They were much honoured by the visit of Dr. Mitchell from the Union of South Africa. He was sure that all present appreciated the immense amount of work and preparation which General Graham had put into organising the Conference. The policy of appointing sub-committees had also facilitated the transaction of business.

After a vote of thanks to the President had been moved and heartily carried, the Conference then adjourned.

* * * * * *

Elsewhere in this issue will be found a résumé of the annual report of the Medical Research Council of Great Britain for 1929-30. The above account of the all-India conference at Calcutta last November will, we hope, give our readers an outline of the corresponding medical research work in India, and it may be of interest to compare the two reports. Both reports show that in Great Britain and India alike a vigorous and well-thought-out policy is in being, not stinted by want of funds. Our main difficulty in India is, however, the obtaining of younger men for future researches. The appointment of a very strong recruitment board for the Indian Research Fund Association in Great Britain may help, but at each annual conference of research workers at Calcutta one sees more grey hairs and balder scalps! India has got to train her young men for medical research work, and already the supply is inadequate to meet the demand.

R. K.

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SIR ANDREW BALFOUR.

A TRIBUTE.

AT the introductory lecture on the life and work of Sir Patrick Manson given at the London School of Hygiene and Tropical Medicine on February 3rd, the Chairman of the Board, Sir Harry Goschen, referring to the death of Sir Andrew Balfour (the Director of the School) which had just occurred, said:—

"I must speak of the sorrow which is in all our hearts. One of Sir Patrick Manson's earliest students, himself destined to become the Director of this great School which has arisen out of Manson's first conception of a School of Tropical Medicine, has passed across the border, and we are all infinitely the poorer for the loss of that great-hearted man, Andrew Balfour. Of his career, starting out from the Edinburgh which he loved so well, and pursued overseas, in the fever camps of Pretoria, in the scourging and cleansing of the city of Khartoum, and his labours throughout the Great War in the Mediterranean Expeditionary Force in Salonika, Egypt, and Mesopotamia, there is no need to speak. This story is known to all of you and also his work on the later expeditions to Mauritius and to Bermuda.

"From the time of his appointment to the post of Director of the London School of Hygiene and Tropical Medicine at the beginning of the year 1924, Andrew Balfour worked with that consuming energy and high sense of duty for the task to which he had put his hand, and it is an honour to stand here to-day in this magnificent home of Hygiene and Tropical Medicine and pay tribute to Andrew Balfour's memory.

"He was a simple soul, who bore all the honours which were heaped upon him with unaffected shyness. Balfour was a man of sterling character, simplicity, and directness of purpose, as honest and open as the day, without a trace of guile. The affection which he inspired in all of us was indeed something wonderful, and his colleagues on the Board of Management and on the staff join with his numberless friends throughout the world in a heartfelt message of sympathy to Lady Balfour and his two sons."

YELLOW FEVER VIRUS.

BY Notification No. 7 of date the 7th February, 1931, the Government of India, Finance Department (Central Revenues), has prohibited the importation of yellow fever virus into British India. This measure is absolutely essential; the insect vector *Ædes aëgypti* is universal and if the virus is imported a widespread and severe epidemic might follow. The notification for India follows on a similar prohibition by the Dutch Government against the importation of yellow fever virus into the Dutch East Indies. It is obvious that in this matter prudence dictates a policy of (*a*) research work and observations on the disease in its endemic areas, and (*b*) experimental work in cold countries from which the insect vector is absent. Thus American investigators are studying the disease experimentally in New York, British workers in London, and Dutch workers in Amsterdam.

THE FACULTY OF TROPICAL MEDICINE, BENGAL.

AT the examination for the Diploma of Tropical Medicine (D.T.M., Bengal), held at the Calcutta School of Tropical Medicine in April 1931, the following 30 out of 36 candidates were successful:—

Passed with distinction.

(In order of merit.)

1. Acharya, Surendra Narayan, M.B. (Cal.), (Government of Bihar and Orissa). Awarded the "Chuni Lal Bose" Gold Medal, 1931.
2. Venkataraman, K. V., M.D. (Madras), (Government of Madras).
3. Taylor, Andrew Copeland, M.B. (Canada). Mission Hospital, Rutlam, Central India. Awarded first prize in Entomology.
4. Philips, George Luke, Diplomate Madras Medical College, I.M.D. (Government of India).
5. Hossain, Kabir, M.B. (Cal.), (Government of Bengal).

Passed.

(In alphabetical order.)

6. Anand, Des Raj, L.M.P. (Agra), I.M.D. (Government of India).
7. Banerjea, Radhakrishna, M.B. (Cal.), Pathologist, Chittaranjan Hospital, Calcutta.
8. Basu, Binaybhushan, M.B. (Cal.), private practitioner.
9. Bhowmik, Bhupendra Kumar, L.M.F. (Bengal), L.T.M. (Cal.), Assistant Health Officer, Jalpaiguri.
10. Chatterjee, Simadri Prasun, M.B. (Cal.), D.P.H. (Cal.), private practitioner.
11. Das Gupta, Bhabanath, M.B. (Cal.), D.P.H. (Cal.), Health Officer, Baranagar Municipality.
12. Dial, Alfred Edgar, L.M.P. (Agra), I.M.D. (Government of India).
13. Dutt, Nalini Mohan, M.B. (Cal.), private practitioner.
14. Dutta, Jogendra Kumer, M.B. (Cal.), D.P.H. (Cal.), District Health Officer, Barisal.
15. Easdon, Horace Verney, I.M.D.
16. Ghose, Narendra Chandra, M.B. (Cal.), private practitioner.
17. Ghosh, Prashanta Kumar, M.B. (Cal.), Honorary Clinical Pathologist, Medical College Hospitals (Out-door Department).
18. Howie, John, M.D., C.M. (Canada), L.M.C.C., Mission Hospital, Jobat, Central India.
19. Mankikar, Dattatraya Shivarao, M.B., B.S. (Bom.), private practitioner.
20. Muhammad Ismail, M., M.B., B.S. (Madras), (Government of Madras).
21. Rai, Chandra Bhanu, M.B., B.S. (Bom.), (Government of the Central Provinces).
22. Rai, Rama Charan, M.B., B.S. (Lucknow), (Government of the Central Provinces).
23. Rangasamy, Setlur, L.M. & S. (Madras), (Government of Madras).
24. Ray, Henry Charles, L.C.P. & S. (Bom.), I.M.D. (Government of India).
25. Ray, Subodh Chandra, M.B. (Cal.), private practitioner.
26. Shanmugam Pillai, Ramaswamy, L.M. & S., M.B., B.S. (Madras), (Government of Madras).
27. Singh, Ghinawan Prasad, M.B. (Cal.), (Government of Bihar and Orissa).
28. Smith, Alice Barbara Stewart, M.D., Ch.B. (Edin.), D.P.H. (Dub.), Superintendent, Rainy Hospital, Madras.
29. Subramania Iyer, Ramaswamy, L.M. & S. (Madras), (Government of Madras).
30. Sur, Sudhir Chander, M.B. (Cal.), private practitioner.

Current Topics.

The Rational Treatment of Arterial Hypertension.

By S. WEISS, M.D.,

and

L. B. ELLIS, M.D.

(Abstracted from *The Journal of the American Medical Association*, Vol. 95, No. 12, September 20th, 1930, p. 846.)

FUNCTIONAL and structural abnormalities of the peripheral vascular system, rather than the degree of

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elevation of the blood pressure, are the significant aspects of "persistent arterial hypertension." Because of the ease with which the systolic and diastolic arterial pressures can be determined, and because of the lack of clinical or laboratory methods for the evaluation and measurement of the peripheral vascular resistance, the height of the blood pressure has come to be considered the index of this resistance. The terms elevated blood pressure and increased vascular resistance, therefore, are frequently used interchangeably, even though a quantitative relationship between these two factors of the circulation does not always exist. Clinical terms such as hyperpiesia (Clifford Allbutt), hypertonia (Pal), and hypertensive cardiovascular disease (Theodore Janeway) define this clinical state of the cardiovascular system more accurately than the generally accepted terms arterial hypertension and essential hypertension.

The diagnosis of arterial hypertension in borderline cases requires considerable judgment. A diagnosis of arterial hypertension is arbitrarily considered justifiable if an individual under normal daily activity shows a prolonged tendency to a systolic blood pressure of 160 mm. of mercury or over and a diastolic pressure of 90 or 95 mm. or over. Primary (essential) hypertension, it has been estimated, is responsible for about 23 per cent. of all deaths in persons 50 years of age and older. Because of the wear and tear exerted on the arterial and arteriolar systems in arterial hypertension, there is hardly a bodily structure or function that may not suffer from the consequences of this condition. Thus, although the ætiologic factors producing arterial hypertension are numerous, arterial hypertension in itself is a causative agent of numerous morbid states of the body.

Pressure is one of the biologic stimuli that lead to cell degeneration. The constant physiologic pressure within the ventricles, arteries, and arterioles may be one source of the natural degenerative processes in these tissues. The relative longevity of man, as compared with other mammals of similar size, is one of the factors that make degenerative cardiovascular disease so prominent in man. The degree of vascular degeneration depends, among numerous other causes, on the height and the duration of the pressure in the vessels. Statistical data have established with surprising exactness the prognostic significance of the level of the arterial blood pressure, although frequent and marked exceptions to such statistical conclusions occur in individual cases.

Elevated arterial pressure *per se* causes relatively slight discomfort in the majority of patients. It is not uncommon for this condition to remain symptomless until the onset of complications, and this has occurred in our experience in 12 per cent. of cases in a group of 1,090 patients with uncomplicated arterial hypertension. When symptoms occur they are usually referable to an unstable vasomotor system. Therapy in uncomplicated hypertension, therefore, should aim mainly to prevent impending complications and to relieve symptoms; it should be shaped so far as possible by a knowledge of the ætiology and nature of the mechanism involved in the pathologic condition. A therapeutic measure that is useful in one stage of the condition may be contra-indicated in another, and one of the most significant results of a proper appreciation of the pathogenesis of this disease is that many therapeutic agents are at once ruled out and thus futile expectations and efforts are prevented.

So many therapeutic claims are made continuously in medical literature that many physicians have become uncertain as to the best treatment for hypertension. It is our purpose in this communication to establish certain principles, and to describe therapeutic measures in the light of experience gained in studies conducted at the Boston City Hospital during the past three years.

ÆTIOLOGIC FACTORS.

Of the factors responsible for the development of arterial hypertension, constitutional predisposition plays a dominating rôle in a large percentage of patients. The frequent occurrence of arterial hypertension in several members of a family illustrates this. The constitutional predisposition not only consists of inherited structural characteristics but also manifests itself in certain functional reactions such as psychic hypersensitivity and excessive mental activity, in the presence of inhibitions and fears, and occasionally in the abnormal functioning of the endocrine glands.

THE MECHANISM OF THE CIRCULATION IN HYPERTENSION.

Next to a consideration of the ætiology of arterial hypertension, an understanding of the mechanism of certain bodily functions, and primarily of the circulation, has the most important relation to treatment; for often, although the primary cause of the disease cannot be influenced, the faulty bodily state can be repaired. It has been claimed that decreased elasticity of the larger arteries, faulty respiratory function, decreased amount of blood in the lungs, increased circulating blood volume, increased cardiac output or increased viscosity of the blood may be responsible, singly or in combination, for the development of arterial hypertension. Part of the confusion in the literature undoubtedly has resulted from statements made on a basis of clinical assumptions and not of quantitative observations. In other instances, conflict in the results of observations has occurred because the studies were made at different clinical stages of arterial hypertension and the clinical condition of the patients was not closely correlated with the results obtained.

We have recently completed a study of a group of patients with arterial hypertension, in whom the respiratory and cardiac volume outputs per minute, the velocity of blood flow, the circulating blood volume and the arterial, arteriolar, capillary and venous pressures were simultaneously estimated. In the absence of cardiac failure all of these measurements fell within normal limits except the arterial and arteriolar pressures, which were markedly increased. In a group of patients showing definite cardiac failure, the changes in velocity of blood flow, vital capacity, and venous pressure were similar to those in other types of circulatory failure.

A study of the foregoing aspects of the circulation demonstrates clearly that the specific abnormal characteristic of the circulation in arterial hypertension is the increased resistance offered by the arteriolar system. This resistance, at least in the early stages of the disease and in the majority of cases, is partly functional in nature. An increased pressure is established in the arterial and arteriolar portions of the vascular system in order to force the blood through the abnormally resistant arterioles and to maintain a capillary circulation which is adequate for normal tissue nutrition. The increased arterial blood pressure is, therefore, a compensatory change which is optimal for the existing vascular resistance, unless cardiac failure has set in, in which case it is usually inadequate.

SPECIFIC DRUG THERAPY.

This brief consideration of the ætiology and pathogenesis of arterial hypertension indicates the complexity of the problem of therapy. It suggests the numerous and often deep-rooted differences that exist between experimentally-induced high blood pressure in animals and arterial hypertension in man.

The majority of therapeutic agents used in the treatment of arterial hypertension have been advocated on the following grounds: (*a*) that they reduce the blood pressure in normal animals, or in animals in which the arterial pressure has been experimentally elevated; (*b*) that they reduce the blood pressure of healthy individuals and of patients with arterial hypertension; (*c*) that they improve the symptoms and the "general condition" of the patients.

It should now be emphasized that, even although a drug or therapeutic agent fulfils any or all of these conditions, its usefulness in arterial hypertension cannot be considered established. Moreover, in numerous instances, even these relatively inadequate conditions are not fulfilled. Acetylcholine is one of the

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substances considered beneficial in hypertension on the basis of pharmacologic observations. The profound vasodilator effect of acetylcholine in anæsthetized animals was demonstrated in 1906 by Hunt and Taveau and has been subsequently confirmed by numerous investigators. In animals receiving intravenously dosages as small as 0.000001 gm. there is frequently a distinct fall in arterial pressure. We have made numerous observations of the effect of acetylcholine in normal human subjects and on patients with hypertension. In neither group was any effect whatever found on the blood pressure or heart rate following intramuscular injections of 0.4 gm., and in only one case out of twenty did the blood pressure drop following an intravenous injection of as high as from 0.05 to 0.1 gm. a minute maintained for ten minutes. The drug is destroyed almost immediately in the blood stream and such vasodilator action as it does exert in man is compensated for by other factors of the circulation, so that the systemic blood pressure is maintained at its original level. The fallacy of inferring effects in man from observations made on anæsthetized animals thus becomes apparent.

The unreliability of conclusions drawn from animal experiments alone is also shown by considering the action of histamine. Histamine, like acetylcholine, exerts a powerful depressor action on the circulation in animals.

We have studied the effect of this substance following continuous intravenous injection in human subjects both with normal and with elevated blood pressures. In doses of from 0.02 to 0.04 mg. a minute it was found that the blood pressure either remained unaltered or underwent very slight, transient, and inconstant fluctuations both upward and downward. Although the animal experiments suggested that histamine might prove of value as a means of lowering the blood pressure, when critical observations were made on man it was found to be useless.

To illustrate the fact that a drug may lower the blood pressure in normal and in hypertensive individuals and yet its therapeutic effect still be of doubtful value, our observations of the effect of sodium nitrite may be cited. Sodium nitrite, in doses of from 1 to 5 grains (0.065 to 0.3 gm.) by mouth, does lower the blood pressure in man. Within about ten minutes of the time of administration of the nitrite there is an abrupt fall in the blood pressure. The pressure may remain at this low level for only a few minutes, although some lowering usually persists for from one to three hours. The extent of the drop in pressure is somewhat increased with the larger doses but is in no direct proportional relationship, and there is great variation in the effects of the drug not only in different individuals but also in the same person at different times. Moreover, there may be unpleasant subjective symptoms from the nitrite which are often quite out of proportion, and apparently unrelated, to the fall in blood pressure. Whether this temporary lowering of the blood pressure has any beneficial effect on the cardiovascular system is highly questionable. In the presence of degenerative changes in the arterioles, sudden and repeated relaxation of the lumen may eventually lead to serious consequences. During the past seven years a few instances were observed by us in which close relationship existed between the onset of cerebral accidents and the beginning of the administration of nitrites.

On the basis of these observations and conclusions, one may define certain of the pharmacologic and therapeutic characteristics essential to a substance that is to be beneficial in arterial hypertension. It is obvious that such a chemical substance must decrease the arteriolar resistance without disturbing essentially the other fundamental, normal characteristics of the circulation such as the cardiac output, the velocity of the blood flow, or the circulating blood volume. The effect of the substance and the persistence of its action on the blood pressure must be such that by repeated administration of the drug marked fluctuations in the blood pressure are avoided. Establishment of a permanent lower level should occur gradually. The normal vasomotor responses essential to normal bodily functions should not be affected. A vasodilator substance that fulfils these requirements and hence is beneficial in the general treatment of arterial hypertension is not available or, at least, it has not as yet been proved of value by exact observations.

THE MANAGEMENT OF THE PATIENT.

Management of the patient in accordance with the individual clinical manifestations and the avoidance of a rigidly outlined routine are the keynotes of the successful treatment of arterial hypertension. The establishment of the diagnosis should be followed by a search for the factors active in the case. Fluctuations in the blood pressure and the factors on which these fluctuations depend should be ascertained. A fixation of the blood pressure at a high level is generally indicative of a more severe disturbance of the vascular system (fixed hypertension) than a fluctuating level of the blood pressure (functional hypertension). The functional capacity of the heart should be evaluated, consideration being given to the opinion of the patient as to the degree of limitation of activity. Observation of the response of the cardiac rate and respiration of the patient to a simple climbing exercise is the most useful test for estimating cardiac reserve that is possessed at present. Determination of the cardiac size by physical signs and by teleröentgenographic examination gives valuable data for estimating the morphologic state of the heart. The morphologic and functional condition of the observable arteries should be gauged so far as possible. Certain conclusions as to the clinical state of the vascular bed can be drawn by studying the normal and the reserve functions of various organs. Sudden occurrence of vertigo, dizziness, temporary palsies, dyspnœa, polyuria, sugar in the urine, or astasia-abasia is often indicative of impending impairment of the vessels of the brain, heart, kidneys, pancreas or extremities, respectively. The examination should include the psychic state. Once the combined knowledge of the pathogenesis and the individual evolution of the arterial hypertension is established, one may proceed to treat the patient.

A proper understanding of the personality of the patient will, of course, determine whether or not it is advisable that he should be told the general significance of his condition. On the whole, it is advisable to avoid concentrating his attention on the level of his blood pressure. Anxiety induced by "blood pressure phobia" is often responsible for further accentuation of arterial hypertension. It makes the patient introspective, neurotic, and irritable. In such instances the significance of the condition should be minimized. In other instances, because of the lack of proper respect for medical advice, it is necessary to confront the patient with the reality of the situation.

Seldom, except in certain cases of malignant hypertension, is it necessary for a patient with uncomplicated hypertension to become a complete invalid. The mental unhappiness in such cases will counterbalance any beneficial effect of physical rest. The severity and the clinical progress of the hypertension, the nature of the patient's occupation, and his economic status, will influence the medical advice. Patients with uncomplicated hypertension tolerate moderate exercise well and react to such exercise with the same qualitative physiologic response as do normal individuals. It is necessary, however, to rearrange the life of the patient in such a manner that he may learn to relax. Night work should be avoided. The patient should take, if possible, a midday rest of one or two hours' duration and should sleep from eight to ten hours regularly. Week-ends should be spent in quiet relaxation and in engaging in some light sport or hobby. In more severe cases, rest periods of from three to ten days should be taken several times a year. Strenuous sports, such as tennis, swimming, or squash, should be avoided. Mild sports in moderation may, on the other hand, be very beneficial. Excesses, in general, are harmful. By

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far the majority of the patients with severe hypertension have never acquired the ability to perform their daily activities in a routine way. If psychic trauma is suspected, a proper psychotherapeutic approach and influence on the patient will give most gratifying results both in gaining the confidence of the patient and in beneficially influencing the hypertension. Optimism should dominate the attitude of the physician.

No special diet has proved of definite value. As a general preventive measure, it is advisable to outline a well balanced diet which contains enough protein to supply about 10 per cent. of the total calories. Salts should be kept relatively low by using only a small amount in cooking and none at the table. Spices should be avoided. If the patient is overweight, the total calories should be below the requirement. A gradual loss of weight produces a most gratifying effect both on the symptoms and on the blood pressure. Water intake should be free. The beneficial effect of drinking large amounts of water has not been established, and, on the other hand, the cardiac work may become increased appreciably by a large fluid intake.

The use of tobacco is not generally contra-indicated in arterial hypertension, unless, as is sometimes observed, patients show a hypersensitivity to it by an accentuation of symptoms and an elevation of blood pressure. In such hypertensive patients even very small amounts of nicotine may be responsible for serious symptoms and complications. The use of tobacco in such patients is to be permanently prohibited.

The bowels should be kept free and daily action without strain assured. Rupture of minute cerebral vessels leading to severe hæmorrhages occurs occasionally during straining. There is a rather marked tendency to constipation in patients with malignant hypertension, although in benign hypertension constipation is not always present. Magnesia magma and phenolphthalein are useful laxatives in keeping the bowel function normal. Not infrequently the establishment of a regular regimen is followed by definite improvement in the general symptoms and a lowering of the arterial pressure.

The beneficial effect of balneotherapy is through its action on the central nervous system. The baths should be moderately warm and not below 34°C., for baths below this temperature elevate the blood pressure.

In a certain group of cases there is apparently a definite association between the onset of the menopause and the occurrence of an increased blood pressure. It is impossible to distinguish between the symptoms due to the climacteric and those caused by hypertension. An analysis of a group of patients at the menopause revealed that the nature and frequency of occurrence of symptoms was essentially the same whether or not hypertension existed. Attention in these cases should be devoted to stabilizing and lessening the symptoms associated with the menopause, with the result that in many of the patients a beneficial effect on the blood pressure will follow. Although its value is by no means definitely established, in certain instances the empiric administration of some preparation of the ovarian gland may be followed by symptomatic improvement.

For patients in whom marked arterial hypertension is associated with definite local and systemic evidence of hyperthyroidism, ligation or resection of the gland is advisable. In the few cases we have observed, there was no essential change in blood pressure, but the patient showed, nevertheless, marked improvement as far as symptoms and heart function were concerned.

Foci of infection should be searched for and eradicated. Such foci, of course, do not necessarily have any relation to the hypertension. Nevertheless, in certain cases, especially in malignant hypertension or in cases of subacute or chronic nephritis with hypertension, successful elimination of the infection may bring about a quick return of the blood pressure to a normal level. Moreover, infections, even if they are not the cause of the existing hypertension, may lead indirectly to vascular degeneration and hence add to the unfavourable factors that hasten the appearance of complications. Head colds, sinus infections, tonsillitis and upper respiratory infections should therefore be looked on as conditions of serious potential consequences. Patients should be kept in bed during the period of such infections. It is astonishing with what frequency congestive failure has been precipitated by an acute infection.

Drug therapy, for reasons given, is of secondary importance. Certain sedatives, such as the various members of the barbituric-acid derivatives and perhaps the chloral group, which have a relative affinity to the vasomotor and other vegetative centres, are of great benefit. Phenobarbital in a half grain dose (0.03 gm.) twice daily lowers the blood pressure desirably in many patients; in others it prevents undesirable fluctuations.

Administration of iodide as a preventive measure for arteriosclerosis is supported by a certain number of empiric results. Potassium iodide may be given in 5-grain doses (0.3 gm.) three times daily for from eight to twelve weeks once in every six months.

In case there is a sudden rise in the blood pressure associated with alarmingly acute cerebral and cardiac symptoms (vascular crisis of Pal), administration of sodium nitrite in doses of from 1 to 2 grains (0.065 to 0.13 gm.) three times daily may be indicated. Venesection and removal of from 400 to 800 c.c. of blood may result in prompt improvement. The intravenous administration of relatively large doses of the barbituric-acid derivatives may also be indicated in the presence of such a vascular crisis. Sodium phenobarbital may be used in doses up to 12 grains (0.8 gm.) of a 1 per cent. solution, injected slowly. Repeated lumbar punctures may relieve the alarming cerebral manifestations.

An outline of the treatment of numerous complications of arterial hypertension is out of the scope of this discussion.

Comment.

To what extent will the careful management of patients with arterial hypertension by the procedures that have been outlined alter their prognosis as to health and longevity? In a small proportion of cases the blood pressure will return to normal and the symptoms will disappear either permanently or for a prolonged period of time. Such remissions in the course of arterial hypertension may, however, occur spontaneously, and these individuals should live well regulated lives and be followed carefully. In a second group there will be some lowering of the blood pressure, although not to a normal level, with accompanying subjective improvement and some checking of the progress of the disease. A third and large group of patients will show no material lowering of the blood pressure, but their symptoms will be lessened and they will be enabled to live more comfortable lives. In certain of these, by the careful regulation of their mode of living, acute cardiovascular accidents will be averted, and to that extent their lives will be prolonged. The remainder, in particular many of the cases of malignant hypertension, will progress inexorably, apparently uninfluenced by therapy, to a fatal termination.

Pessimistic though it may seem, this presentation of the problem of the treatment of arterial hypertension is offered with the hope that it will yield constructive results. It is easy to be attracted by recognized therapeutic triumphs; it is also a common human fallacy to listen to and follow therapeutic claims that have no proper foundation in conditions in which "cures" are not available. But medical skill, wisdom, and a therapeutic sense of proportion are more needed in the management of diseases in which specific therapy is not available than in morbid states in which routine administration of some therapeutic measures re-establishes health.

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Sight-Saving-Class Work.

By E. V. L. BROWN, M.D.,

and

LEWIS H. CARRIS.

(Abstracted from the *American Journal of Ophthalmology*, November 1930, Vol. 13, No. 11, p. 983.

THE sight-saving-class movement is a relatively new form of specialized education. It originated in London in 1908, and the first class in America was established in Boston in 1913. Since then such classes have been organized in many of the larger cities of Great Britain, the United States, and the Dominion of Canada, and to a lesser extent in cities on the continent of Europe. In the United States there are at the present time 358 sight-saving classes, while in the Dominion of Canada eleven classes have thus far been established.

When the classes were introduced in England, they were called "myope classes," the original intention being to provide an education for children afflicted with marked myopia and at the same time to protect their vision and prevent the progress of the defect. In the United States these classes were at the beginning referred to as "classes for the semisighted," subsequently becoming known as "conservation of vision classes" or "sight-saving classes." The scope of these classes in Great Britain, Canada, and the United States, was quickly extended to pupils suffering from other types of defective vision sufficiently serious to prohibit their undertaking with safety and profit the educational work of the regular classroom, yet possessing too much sight to warrant their being educated by the Braille system in schools for the blind.

In the beginning, the children assigned to these classes in the United States were completely segregated and all their work was done in the special classroom. The sight-saving class has made it possible for the child to maintain his status in the "sighted" group instead of being classified as blind. By this means many children who would otherwise have been enrolled in schools for the blind are enabled to attend day schools near their own homes. In schools for the blind there has always been a certain percentage of children with vision better than 20/200; for these children it would be far more advantageous to be in the regular public schools if the special sight-saving-class care could be provided for them. It is generally accepted by those familiar with sight-saving classes that, other things being equal, 20/200 is the dividing line between the so-called visual education and tactual education.

Some of the fundamental practices in the conduct of sight-saving classes are the following:—

(1) The books used are printed in 24-point type on buff paper.

(2) In practically all cases pupils are admitted to sight-saving classes on the approval of the attending ophthalmologist.

(3) During his residence in a sight-saving class, the pupil is, wherever possible, kept under his ophthalmologist's supervision.

(4) In the majority of cases, sight-saving-class pupils participate in the general activities of the school if these activities do not involve the harmful or unwise use of the eyes; for example, they join the regular class in any study where oral recitation is possible.

(5) Sight-saving classes are provided with suitable special equipment consisting of movable desks with adjustable tops, placed in a room well lighted, both naturally and artificially, with all reasonable precautions taken to prevent glare.

As is the case in all forms of educational work under physical handicaps, the number of pupils enrolled in a sight-saving class must be limited. The best prevailing practice is a maximum of sixteen, when no more than four grades are represented. The problem of sight-saving classes will never loom large in any public school system, inasmuch as only one child in approximately each 500 enrolled in the public schools requires such special education. On an average, this would call for at least one sight-saving class in every city having a population of 25,000, with necessary provisions made for rural districts.

In order that these classes may be conducted under as favourable auspices as possible, it is imperative that teachers should be especially prepared for this work, that they be trained in the special methods of instructing such handicapped children, and that they acquire some knowledge of the eye, such as its anatomy, physiology, and principles of care. The eye instruction given to sight-saving-class teachers is designed to enable them to carry out intelligently the advice of ophthalmologists and to apply the principles of eye hygiene in the classroom, as well as to give them a sense of responsibility for the ocular welfare of their pupils and a knowledge of correct procedure in regard to certain eye defects.

The guides for the admission of children to sight-saving classes are as follows:

1. General statement. Children having visual acuity of 20/70 or less in the better eye after proper refraction. In addition, the following are recommended as potential candidates:

(*a*) Children in elementary schools having four or more dioptres of myopia.

(*b*) Inactive, subsiding (or regressive) cases, such as interstitial or phlyctenular keratitis, optic neuritis, trachoma, etc., in which some irritation may be present, provided the approval of the attending physician is given.

2. All cases must be considered individually.

3. Any child who in the opinion of the ophthalmologist would benefit by assignment to a sight-saving class, subject to suggestion for treatment and training by such oculist, and the acceptance of the educational authorities having charge of such classes.

4. It is assumed that all the children assigned to sight-saving classes have average normal mentality.

It is probable that with additional experience it may be necessary to modify or change the present guides. It must be emphasized, however, that these guides are not for ophthalmologists, but for the preliminary screening or sorting out at school of those potentially eligible who must subsequently be evaluated by oculists.

Only a relatively small number of American ophthalmologists have given enough attention to the sight-saving-class movement to be thoroughly conversant with the types and extent of visual deficiency which constitute eligibility for sight-saving classes and to the educational advantages which these classes offer to pupils handicapped with seriously defective vision. It would be very helpful if oculists would agree on a more complete set of guides than the one given above for school systems. Information would then be available for the ophthalmologist who is not familiar with sight-saving-class work.

In conclusion it may be said that the sight-saving-class movement is becoming increasingly a factor for saving sight. It is, however, believed that the service could be greatly enhanced if a committee of ophthalmologists would evaluate and criticise the conservation of vision activities of these classes, just as teachers have reviewed and evaluated their pedagogical aspects. It is suggested, therefore, that a special committee consisting of representatives from the three ophthalmological societies be appointed to co-operate with the National Society for the Prevention of Blindness.

Notes on Antiseptics for Eye Work.

(From the *American Journal of Ophthalmology*, November 1930, Vol. 13, No. 11.)

Brilliant Green in Ophthalmic Therapy. By F. M. Liebermann. (p. 1020.)

IN 1890 the writer advocated the use of aniline dyes as antiseptics. Other investigators have since used brilliant green advantageously in the treatment of blepharitis and in the sterilization of both the instruments and the field of operation. The author tried brilliant green in thirty-five cases of chronic blepharitis, which had resisted a variety of therapeutic agents. His

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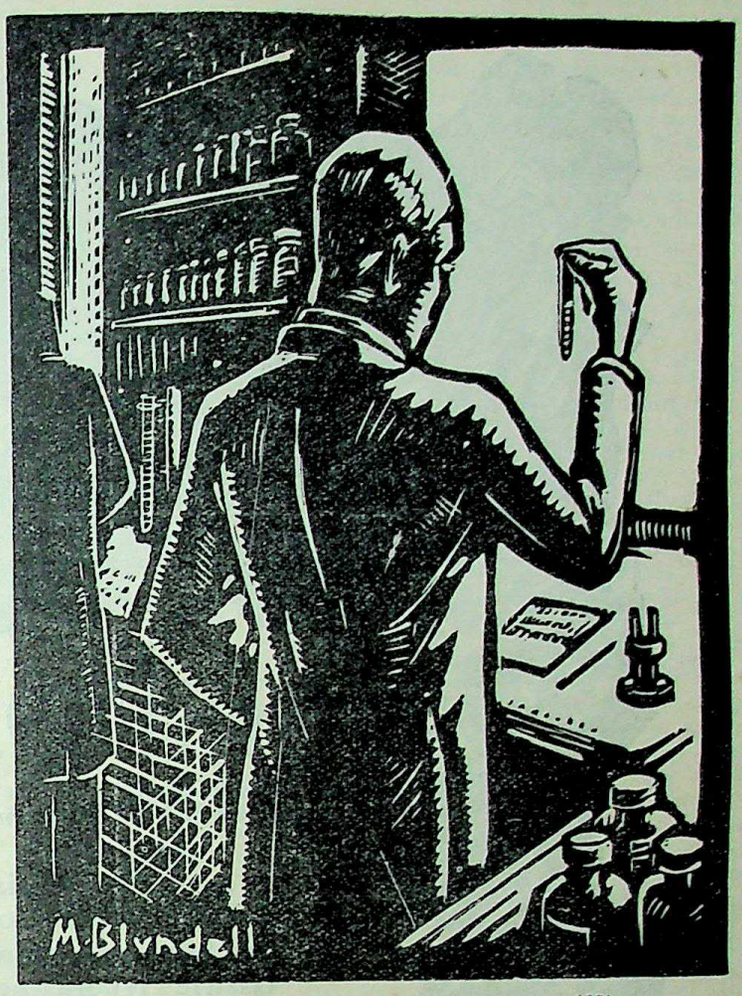

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conclusions regarding its different uses are as follows: (1) Brilliant green is a good bactericidal remedy for the preparation of the skin and of the lid margins in ophthalmic operations. (2) Brilliant green, although not inferior in its bactericidal action to tincture of iodine, causes no secondary disagreeable after-effects (hyperæmia, swelling of the lids, loss of the outer layers of epithelium) peculiar to iodine. (3) The effect of brilliant green in the treatment of blepharitis is based upon its strong bactericidal action. (4) Since most of those with blepharitis suffer from scrofulosis, they also require general treatment. (5) Brilliant green is not a specific for blepharitis, but is of great value. (6) For clinic cases, brilliant green is best prepared in the form of an ointment.

Trypaflavine in Eye Diseases. By C. Lottrup-Anderson. (p. 1020.)

TRYPAFLAVINE is an acridin compound, first described by Ehrlich in 1912, and used after that to some extent for affections of the lids; but it seems to have been forgotten until within the last few years. The author uses a one per cent. solution in equal parts of alcohol and water and applies it with a swab.

The author has had good results in the following conditions: (1) In eczema of the eyelids it gives prompt relief especially if the skin is dry and scaly; in the moist type it often produces irritation, probably because the moisture allows a deeper penetration. (2) In blepharitis it is effective; a hordeolum often yields to one treatment, and recurrence does not occur. (3) In one case of pemphigus, in which everything else had been tried, an application every eight days controlled the pain, and all redness and irritation of the eye disappeared. (4) In peripheral corneal ulcers good results were obtained. It has not been used in extensive ulcerations.

If the solution is instilled into the conjunctival sac once or twice a day for a considerable period of time, there is a danger of a yellowish discoloration of the cornea which may be more or less permanent. Solutions of trypaflavine are not entirely stable, and often become irritating to the eye if over fourteen days old.

The Comparative Value of the Most Important Disinfectants used in Ophthalmology and Surgery. By B. L. Polak. (p. 1021.)

POLAK investigated the bactericidal action of the following eleven disinfectants used in ophthalmology and in general surgery: bichloride of mercury, mercury oxycyanide, zinc sulphate, protargol, collargol, copper sulphate, boric acid, rivanol, optochin, eucupin, and magnocid.

The experiments were carried out *in vitro* with the *Staphylococcus pyogenes aureus*. Bichloride of mercury and mercury oxycyanide proved to possess the strongest bactericidal properties; the staphylococcus could not survive in a 1 to 1,000,000 solution of either preparation. The weakest bactericidal solutions of protargol, collargol, zinc sulphate, and copper sulphate were 1 to 1,000,000, 1 to 30,000, 1 to 10,000, and 1 to 3,000, respectively. Of the newest disinfectants, rivanol proved to be the most efficient, having a distinct bactericidal effect in a 1 to 20,000 solution, while magnocid, eucupin, and optochin were considerably inferior to it. Boric acid controlled the growth of the staphylococcus only when in saturated solution.

Treatment of Chronic Rheumatism by Radiations.

By SIR LEONARD HILL, M.B., F.R.S.

(Abstracted from *The British Journal of Actinotherapy and Physiotherapy*, February 1931, Vol. V, p. 225.)

ULTRA-VIOLET rays have a bactericidal effect even at the temperature of liquid air, as shown by Dewar in the case of luminescent bacteria, and these rays produce an equal erythema of the skin whether the irradiated part be cooled or warmed. Dr. Taylor and the writer have recently observed this to be so, taking great care to keep their Hanovia lamp running on the same volts and amperes during each exposure. On the other hand, infra-red rays and the longer visible rays were found to have no infusoria-killing, or bactericidal, effect when Dr. Eidinow and the writer took care to keep the culture medium cool. So, too, with the high frequency fields used in diathermy, so long as the culture medium is kept cool no killing of infusoria occurs. The rays here in question are very long in wave-length, such as are used for broadcasting.

The longer infra-red rays, being absorbed by a very thin layer of water, have very little power of penetrating the epidermis. The short infra-red and visible rays, on the other hand, penetrate the skin to a greater extent, and red rays even pass through the blood circulating in the derma. These rays are found, then, to heat up the subcutaneous tissue more than the long infra-red rays, that is, when the radiation is such that the surface reaches a just-endurable temperature, as was shown by Sonne and confirmed by Argyll Campbell and the writer. Owing to their greater penetration the short infra-red rays provoke more easily flushing and transpiration of the skin; under their influence, then, the skin feels less dry and burning, that is, when two sources of equal energy are compared. The new radiants, recently introduced for gas fires, give more of these rays, and are, therefore, more comfortable.

The long infra-red rays are at present acclaimed as being of great value for the treatment of chronic rheumatism, and a fashion has set in for using dark infra-red sources rather than baths fitted with incandescent lamps which have been found useful in the past. There seems to be a belief that infra-red rays have, apart from their heating effect, a power akin to that exerted by the shorter ultra-violet rays, which, while penetrating a very little way into the epidermis, undoubtedly produce a profound effect on the living cells therein. Some hold that there is an interference between visible and dark infra-red rays, and treat their patients in darkened rooms. Short exposures are also given to infra-red sources, and the rays are being used with the same caution as ultra-violet rays are used. So far, however, as physiological evidence goes, the long infra-red rays act by their heating effect, and have no other power. The ability of rabbits to withstand a lethal dose of staphylococci can be raised by exposure of the shaved skin of the animals to a gas fire; but Dr. Eidinow and the writer found that to effect this the area of skin exposed had to be large, and the time of exposure many hours. The rabbits had to be kept from being overheated, by a fan. The research workers of the Gas Light and Coke Company at Watson House have kindly made up for the writer some sources of radiation, each consisting of a ring of incandescent gas mantles combined with a stainless steel bowl-shaped reflector, the whole source being fitted on a serviceable stand. With these sources the writer has treated several cases of chronic rheumatism. He has aimed at producing, by a just-endurable heating of the skin, as much flushing and sweating as possible. He has used three or four sources at once and irradiated both the body and the affected joints, giving as long exposures as possible, e.g., one hour three times a week. The patients have been told also to warm their painful joints at the open door of a gas oven when at home.

Some severe chronic cases of rheumatism which had been treated for many weeks by short exposures to the mercury vapour lamp, the local tungsten arc, and a source of infra-red rays appear to have received more benefit from two or three prolonged exposures to these incandescent gas lamps than they had got in all the previous weeks; their joints have become easier, looser, and less painful. One man, an early case of rheumatic affection of both shoulders, has been able to return to work. Another, whose back was covered with acne, has been relieved of this trouble. The peak of energy of the radiation from the gas lamps is, as Dr. Taylor

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finds, at about the same wave-length as that for the electrical sources of infra-red rays.

The writer has also had constructed for his use a gas-heated source of dark infra-red rays giving the same surface temperature as the electrical sources. Whatever be the source, the heat appears to be the active agent by provoking flushing, transpiration, a pouring out of lymph, loosening of connective tissue and lessening of pain, and by promoting nutrition and so antagonising chronic infection. As cheap and efficient sources of radiation for the treatment of rheumatism, bowl-reflector incandescent gas and electric heaters are available.

Erroneous Citations and Titles of Scientific Papers.

By C. A. SHULL.

(Abstracted from *Science*, Vol. LXXIII, April 3rd, 1931, p. 363.)

EVERYONE who attempts to examine the literature cited in scientific papers will almost immediately run into aggravating difficulties because of the lack of care of authors who are too anxious to publish to take proper time with this indispensable adjunct to a good paper—the literature cited. As an editor with some years of experience in handling publication of papers, I have found it necessary to check up on *all authors*. There is seldom a paper handed in that is free of erroneous citations. In some few cases the citations have been 100 per cent. in error, *even when the author was citing his own work*. To give more concrete quantitative data concerning this evil, a check has been made on a series of papers handled during 1930. The batting average for whole numbers of a publication is approximately 54 per cent. in the cases examined. Forty-six per cent. of the citations needed corrections in some way or other. The errors are of numerous kinds, including misspelled names of authors, wrong initials of authors, omission of parts of titles, or substitution of words in titles, change of singular to plural or *vice versa*, omission of umlauts in German titles and of accents in French, failure to capitalize German nouns, capitalization of German adjectives, errors in name of journal, errors in volume number, omission or errors in page limits, error in, or omission of, year of publication, etc., etc. Every conceivable error that can be made is being made daily by authors, and most of them seem to be utterly unconscious of bad technique in this connection. Or perhaps they think: What's the use of having an editor, if not to do these chores?

Since very few editors take the time and trouble to check up on these errors of citation before publication, the literature lists published during recent years are full of erroneous citations, and it is for this reason that it is never safe to copy a citation from such a list. Nothing but consultation of the original source can ensure accuracy, and every author who cites literature should take enough pride in his work to ensure accuracy in the literature citations.

Reviews.

PUBLIC HEALTH PRACTICE IN THE TROPICS.—By J. Balfour Kirk, M.B., D.P.H., D.T.M. & H. London: J. & A. Churchill, 1931. Pp. 498, with 80 illustrations. Price, 15s. net.

DR. BALFOUR KIRK has himself travelled extensively and, as his book and references show, has cast far and wide for information and descriptions of public health practices in a large number of tropical countries. As he himself says, one cannot venture far into the tropics without encountering the native of India and while he is welcomed for his qualities, being frugal, law-abiding, and industrious, Dr. Kirk would seem to hold him responsible for much of the insanitation in tropical countries and this he would ascribe largely to the peculiar tenets of the Hindu faith, which despises the body and exalts the mind. This may be to some extent true, but every earnest faith, including Christianity, has passed through this stage and it would hardly be fair to accept such a wide generalisation as this.

Dr. Kirk divides his book into two parts, Part I dealing with preventive medicine, and Part II dealing with sanitation. The first part, therefore, deals with individual diseases, their epidemiology and prevention, while Part II deals with general environmental sanitation, housing, water supplies, etc. The first part has received more attention from the author than the second which is in some places sketchy and short. The main diseases of the tropics are thoroughly dealt with in an up-to-date manner, especially those with which the author has had an intimate acquaintance.

The chapter on cholera is rather disappointing. The work of Russell, d'Herelle, Malone, Khan, and other modern workers in India is not mentioned and some of the statements may be misleading. It is stated that epidemic cholera is essentially a water-borne disease, but that water plays little part in the epidemiology of endemic cholera. What the writer exactly means by this is not clear. The definition of "carriers" is not made clear. In one part the author states that only agglutinating vibrios from colonies should be accepted but in another he states that non-agglutinating vibrios constitute a carrier. As a matter of fact few are agreed on the correct interpretation of the word. The chapter on kala-azar is up to date. Malaria is well discussed and the work of Christophers, Covell, and Sinton, on the spleen index and parasite enumeration fairly fully described. There is no mention of plasmoquine and its application in preventive treatment. Plague is dealt with adequately, the writer leaning to Hirst's opinion regarding the importance of the parts played by *cheopis* and *astia*, respectively.

The chapter on hookworm gives a good account of a hookworm campaign, but its value would have been enhanced if references had been made to the work carried out in India by Chandler and more recently by Maplestone.

Avitaminosis of B is accepted as the cause of beri-beri. Epidemic dropsy is inadequately discussed and no mention is made of the work of Megaw and Acton. For leprosy the author seems to favour compulsory segregation, tempered with discrimination. Muir's publications are extensively drawn on for this chapter. The account of sleeping sickness is very interesting. Dr. Kirk considers the identity of *T. rhodesiense* and *T. brucei* to be more than doubtful. Transfer of infected villages to new sites, concentrating the latter on roads, seems to offer the best line of preventive action at present.

The treatment of tuberculosis problems in tropical towns is likely to follow along European lines, as municipal organisation in the tropics is following European practice. In the smaller districts the case is otherwise; *ad hoc* methods of attacking tuberculosis there do not seem to offer high prospects of success and we must look for education and propaganda amongst the rising generation to sow the seeds of sanitary progress all round.

Part II dealing with sanitation has been referred to; town planning, housing, milk supplies, meat markets, water supplies, and the disposal of excretal matters, are dealt with *secundum artem* and there is not much new in the treatment of these subjects, but the illustrations are numerous and good.

Public health workers will find the book interesting and of value. The printing and pictures are excellent.

A. D. S.

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Extract from the Medical Journal of Australia, October 4, 1930.

(The Official Journal of the B.M.A. in Australia).

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CLIMATE AND ACCLIMATIZATION: SOME NOTES AND OBSERVATIONS.—By Sir Aldo Castellani, Hon. K.C.M.G., D.Sc., M.D., F.R.C.P. London: John Bale, Sons & Danielsson, Ltd., 1931. Pp. viii plus 152. Price, 7s. 6d. net.

CLASSICAL epidemiology, represented by Hippocrates and Sydenham, attributed to atmospheric and telluric influences a major part in the production of epidemics of diseases. Later, the discovery of the specific bacterial causation of epidemic diseases relegated these influences very much to the background. Within the last 20 years, however, the pendulum has swung back again and protagonists like Sir William Hamer and Sir F. Cruickshank, and many others are endeavouring to put the Hippocratic views into their proper perspective. So with tropical diseases. Thirty years ago all the evil effects of residence in the tropics were put down to the results of climatic influences; then came Manson, Gorgas, and others, who have held that parasitic diseases and insanitary conditions are the main, if not the sole, cause of the disabilities of residence in the tropics. There is a school now which would almost deny that tropical climates *per se* can affect the health of a European provided he keeps free of parasitic disease. But there are many who now hold that this is not so and that residence for years in a tropical climate exerts a profound physiological effect on the various elements of the human organism, and that this may become pathological without any parasitic intervention. Sir Aldo Castellani belongs to the last-mentioned group and he has gathered together all the evidence, *pro* and *con*, in a little volume published by John Bale, Sons & Danielsson. The book has three chapters—a general one on climate and two on the effects of climate, and a short note on acclimatization. There are eleven pages of references which are by no means the least valuable part of the volume. The main part of the book consists of a discussion on the question whether the climate of the tropics has effects sufficiently deleterious ever to be called pathological. A large amount of evidence is set forth on both sides, leaving the reader somewhat confused as to where the truth lies. The reason in many cases is that more extensive observations are required for elucidation and verification. So-called "normals" for European countries are by no means applicable to indigenous tropical races.

In the matters of basal metabolism, the numbers of the blood cells and the hæmoglobin values, endocrine action, blood sugar and cholesterin levels, etc., there is still much more work required, especially on indigenous races. Sir Aldo's book will serve a very useful purpose in stating the present case for new workers and in giving references to work already done.

The author divides the serious effects of exposure to sun and heat into heat-stroke associated with high body temperature, and heat-syncope or exhaustion, with symptoms mainly due to cardiac failure and with little or no fever. The important paper by Hutchison on "Heat-stroke amongst British Troops in the United Provinces" is not mentioned. Sun traumatism, or *coup de soleil*, the author regards as indistinguishable in symptomatology from heat-exhaustion and heat-syncope. "Heat-stroke" he considers synonymous with heat-exhaustion. Harvey's work at Kasauli on solar of Woodruff who objects to the glare from white buildings—but are buildings meant for the people outside or inside? The subject of building design in the tropics is in its infancy, and it would appear that the architect has had his own way far too much in the past.

radiation is fully noticed.

The views on acclimatization are short and are mainly a recapitulation of work and discussion on the colonisation of North Queensland in Australia. The book advises the wearing of white as by far the best colour, but says that buildings should never be painted white, and that the outside should be of a dark red colour. What will the builders of New Delhi say to this? The statement regarding buildings is based on the opinion

No specific reference is made to snow blindness but only to conjunctivitis. We find no mention of the valuable observations made during the Mount Everest Expedition on the physiology of pressure and altitude though a reference to one of Hingston's papers is given in the bibliography; and a bibliography on the effects of tropical life should include a reference to Davidson's book.

A. D. S.

SELECTED READINGS IN THE HISTORY OF PHYSIOLOGY.—Edited by J. F. Fulton, M.D. London: Baillière, Tindall and Cox, 1930. Pp. xx plus 307, with 21 plates and 39 figures in the text. Price, 22s. 6d. net.

THIS is a very suitable companion volume to the recently published "Selected Readings in Pathology." The latter had a sub-title "From Hippocrates to Virchow"; it would have been better had the editor of the book under review followed this example and given as the sub-title of his book "From Aristotle to Claude Bernard." As it is, he has included the writings of a very large number of living physiologists. The book is meant to be a historical one, and it is impossible to estimate the historical value of even the most outstanding pieces of work at a short range.

The selections on the whole are good. There is encouragement for people of all ages. One photograph shows Helmholtz at the age of 27, the year after the publication of his memoir on the conservation of energy, and another, Pavlov, apparently still very active at the age of 80. The readings are not in historical sequence, but, with the exception of the first and the last chapters, on "General Principles" and "Miscellaneous," respectively, have been arranged more or less according to "systems"; this arrangement is a more satisfactory one. The chapter on the circulation of the blood makes the most interesting reading, in our opinion. For about two thousand years we were on the verge of a complete understanding of the circulatory system. Harvey's final triumph appears to have been one of character rather than of brain.

The printing and paper are excellent, and the whole production is one which the most pampered bibliophile would be pleased to put on his shelf.

L. E. N.

A TEXTBOOK OF MEDICINE.—By American Authors. Edited by R. L. CECIL, A.B., M.D., Sc.D. Second Edition. Revised and entirely reset. Philadelphia and London: W. B. Saunders Company, 1930. Pp. 1592. Illustrated. Price, 40s. net.

THE first edition of this book proved to be very popular. A very large number of the readers of this journal appear to possess a copy, as it is frequently quoted. We are not surprised that it should be popu- Dr. Victor Heiser, who is at present in India, and the late Dr. Charles W. Young. Many advances have been made in the last four years, but they have not entirely changed the face of medicine so that we must conclude that the exhaustion of the first edition necessitated a reprinting and the editor has wisely taken advantage of this to get some of the sections revised. Tropical lar; the readers get good solid value. In the fifteen hundred pages the editor seems to have collected about as much information as one usually gets in the six-volume systems of medicine. There are 130 contributors, almost all Americans. The names of most of the contributors on tropical diseases are well-known ones, whilst in some cases the writers themselves are quite familiar to us in India; amongst the latter are diseases do not seem to have been quite as fortunate in the matter of revision as many other subjects; the chapters on plague and kala-azar, for example, though excellent, are not up to date, for the reason that their writer died shortly after the publication of the first edition. In many chapters the revision has been very thorough.

L. E. N.

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The volume is surprisingly handy for the number of pages it contains. We can recommend it to practitioners and to students.

L. E. N.

FRACTURES AND THEIR COMPLICATIONS.—By G. E. Wilson, M.B. (Tor.), F.R.C.S. (Eng.), F.A.C.S. London: Baillière, Tindall and Cox, 1931. Pp. viii plus 415, with 306 figures in the text. Price, 35s. net.

THIS book of 415 pages by Mr. G. E. Wilson can definitely be called an addition to the literature which deals with fractures from a speciality outlook.

The author opens with a general consideration of fractures, and is dogmatic in his opinion that a complete knowledge of the anatomy and development of bones is essential to any surgeon before he should even contemplate taking up this important branch of surgery.

Mr. Wilson reduces and splints all his fractures on the fluoroscopic table, and does not let his patients leave it until he is quite certain that the fragments are in perfect, or as perfect as possible, anatomical alignment; and he strongly deprecates the practice of waiting till swelling has disappeared before reduction and splinting; an opinion with which we agree.

The repair of fractures is dealt with in a short chapter, where the necessity of making a careful and definite differential diagnosis between delayed union and non-union is emphasised, and the appropriate treatment for each condition is well described.

Mr. Wilson then discusses particular fractures, taking each region and limb in turn, carefully describing the mechanism by which each fracture is caused, and including descriptions of symptoms and physical signs.

When dealing with the skull he concisely enumerates the differences between concussion and compression, and he places great importance on the respiration rate and on the presence or absence of external bleeding when giving a prognosis in cases of fracture of the skull.

As all regions and limbs are dealt with carefully and as all the important fractures are discussed in full, we shall only comment on one or two of them. The author uses his own method of reducing a Colles' fracture, which consists in pressure of his thumbs on the upper end of the distal fragment from the posterior aspect of the limb and of his fingers on the proximal fragment from the anterior aspect; he states, however, that all surgeons have not the necessary strength in their fingers to reduce the fracture by this method. The only alternative method described is to push the hand upwards and backwards till crepitus is elicited, then to reduce as before. We consider it a notable omission that no mention is made of the admirable method of Sir Robert Jones.

In the chapter which deals with actual splinting, the author is emphatic in his choice of plaster of Paris. Indeed he states that with the exception of the Thomas' splint which he uses for fractures of the femur, and a bent iron tubing splint for compound fractures of the humerus and tibia, all splints except plaster should be relegated to the scrap heap. Further, the plaster should be removed as soon as union is sufficient to bear gentle movements, and the patient should be encouraged to perform natural movements himself rather than set, graduated exercises.

The book is well illustrated with a wealth of excellent skiagrams, but we should like to see some photographs or diagrams of the plaster casts which are described, as one or two of them are a little difficult to follow from the written description; we feel that this criticism, made in all good faith, will not in any way detract from the value of the work, and we hope that the author will, in a future edition, see his way to include such illustrations.

The book is certainly a good one, it is written carefully, and is obviously the result of a large practice in the treatment of fractures. Students preparing for the higher surgical examinations, and practitioners who perhaps have not had a long experience in this branch of surgery, will read it with advantage.

H. E. M.

INFANT FEEDING IN GENERAL PRACTICE.—By J. V. C. Braithwaite, M.D., M.R.C.P. (Lond.). Bristol: John Wright & Sons, 1930. Pp. xv plus 140. Price, Rs. 3-6. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

IN this small and practical handbook the author has fulfilled the declared intention of the work, that is, to present in a concise manner the essential matters regarding the feeding of infants with which every practitioner should be familiar.

The first two chapters are devoted to breast feeding, its practical conduct and the difficulties which may arise. The author rightly regards the minor difficulties as stimulants only to further efforts and gives many useful hints as to how they may be overcome, but the view that a mother suffering from pneumonia may nurse her baby strikes us as extreme.

The chapters on artificial feeding in the early months are clear; various methods are discussed and sufficient is said on the nature and value of the commoner proprietary foods to ensure their correct use. The author advocates a milk mixture somewhat low in fat and high in carbohydrate as perhaps the safest for general use, but lays insufficient emphasis on the necessity for adequate vitamine content.

The period of later infancy or transition to mixed feeding is somewhat scantily discussed and is not in sufficient detail to be of much value. Promotion to the more advanced forms of diet is recommended at an earlier age than that generally in vogue.

The second half of the book is devoted to the nutritional disorders of infants and conditions simulating them. The classification of Finkelstein is followed and an admirable summary of this confusing subject, the more confused by the number of conflicting views held, is presented.

The book will serve its purpose well, offering as it does a clear exposition of the chief facts of importance connected with the feeding of infants.

E. H. V. H.

SEASONAL VARIATION IN MAN. (A THEORY.)—By E. Hughes, M.R.C.S., L.R.C.P. London: H. K. Lewis & Co., Ltd., 1931. Pp. ix plus 126. Illustrated. Price, 6s. net.

"SEASONAL Variation in Man" by Edmund Hughes is a neat little book of 126 pages published by H. K. Lewis & Co., London. The book is peculiar in some respects and marks a distinct departure from the majority of books on medical and scientific literature, in not following the stereotyped lines of presentation of ideas. The author aims at propounding a hypothesis to explain certain "disease characters," e.g., rickets in man, based on the principle of evolution and natural descent. With this proposition in mind, he has presented a group of facts from normal and morbid manifestations of life in man and the lower animals for the consideration of his readers. The argument broached concerns a stage of causation preceding that at which experiment usually begins, and the data put forth have so many gaps between them that a coherent comprehension of the subject-matter seems difficult, at least to the cursory reader. So little work is done on, and so little is known about, the problem dealt with, that, in the present stage of our knowledge, it would be hazardous on the part of the reviewer to critically survey and offer an opinion on the plausibility of the hypothesis enunciated. That subtle changes are induced in the chemistry of protoplasm with changes in seasons and environment cannot be doubted, though

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M.D. (Lond.), D.P.H., D.T.M. & H. (Eng.), Major, Indian Medical Service

Assistant Director, Malaria Survey of India.

PREFACE.

Since the immense importance of the rôle played by mosquitoes in the transmission of disease has come to be generally recognised, the literature dealing with the application of various anti-mosquito measures has become so extensive that it is difficult for the average malaria worker to keep in touch with the different methods advocated. In the following pages an endeavour has been made to give some account of these methods in a convenient form.

It is impossible in a work of this kind to deal really adequately with the subject of drainage, which is largely a matter for the skilled engineer, but a brief description has been given of most of the points of practical importance to the malariologist. Other important measures, such as screening, oiling and the use of Paris green have been treated in considerable detail, whilst an attempt has been made to make some reference to all the measures which have been advocated in the literature.

An important feature of the book is the bibliography, which contains 570 references to books and articles dealing with the subject. These have been arranged for convenience under headings of the various measures dealt with. A list of the sources and prices of various apparatus used in the application of anti-mosquito measures is given as an appendix.

It is hoped that the description of the various measures which have proved of practical importance will make the book of value to the man in the field, and that the bibliography will be of service to malariologists generally.

CONTENTS.

Part I.—Protection against Bites of Mosquitoes.

Part II.—Measures directed against Adult Mosquitoes.

Part III.—Measures directed against Larvæ of Mosquitoes.

Appendix.—List of Sources and Prices of Anti-Mosquito Apparatus.

Bibliography of 570 references to Literature, arranged under headings of the different subjects.

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biochemistry has not developed enough to be able to elucidate the true nature of the changes involved. The conception advanced by the author cannot be lightly brushed aside. To the imaginative and informed mind, the book will appear interesting in the extreme, as it presents a bold and basic conception of the rôle of seasonal variations in disease and opens up a new vista of thought and future research.

P. D.

ANNALS OF THE PICKET-THOMSON RESEARCH LABORATORY. Vol. VI. (The Pathogenic Streptococci: The Role of the Streptococci in Scarlet Fever.) London: Baillière, Tindall and Cox, 1930. Pp. xiii plus 470, with 13 plates. Price, £2 2s. net.

THE whole of this volume is devoted to the rôle of the streptococcus in scarlet fever. The disease being, if not rare, as many suppose, at least less common, in India than in temperate climates, this volume will have less special appeal in this country than, for example, one which is promised for next year, the rôle of streptococci in skin diseases. It is pointed out in the preface that more work on this subject has been done and reported during the last five years than from the beginning of time up to the commencement of this period. The Dick test has undoubtedly been the main stimulant. Reference is made in the text to about 1,400 research papers. The editors have done a little arithmetic and suggest that if each paper represents a year's work they are reviewing a thousand years of research work on streptococci in scarlet fever. We don't quite agree with either the assumption or the arithmetic, but as they probably err in opposite directions the conclusion may be correct.

Though there are opponents to this conclusion, it may be claimed that this thousand years of research work has proved that scarlet fever is caused by a specific hæmolytic streptococcus which can be called *Streptococcus scarlatinæ*. The editors, or should we say authors, as in this matter they appear to form a kind of scientific duality, have summarised the evidence very well indeed. They claim fifteen points in favour of their conclusion.

The volume is produced in the customary attractive and useful form. There are fewer plates than usual, but these are of the same excellent quality. There are 32 pages of references to literature and two indexes; these are particularly useful.

The authors' contribution to the problem has been almost entirely of a literary nature, but the contribution has been a very important one, which can be valued at well above the average of the 1,400 individual researches cited; thus we can now claim that during the last five years one thousand and two years of research work in this one subject have been achieved.

L. E. N.

MODERN METHODS OF TREATMENT.—By Logan Clendening, M.D. Fourth Edition. St. Louis: The C. V. Mosby Company, 1931. Pp. 819. Illustrated. Price, $10 net.

WE had the pleasure of reviewing the second edition of Dr. Clendening's book two and a half years ago; that two further editions have been called for in the interim is evidence that it is in considerable demand. The general plan and size of the book remain unaltered but several sections have been re-written.

Our favourable impressions have been confirmed by the present edition and there are only one or two small matters that call for comment. There is no mention of plasmoquine among the drugs having a specific action in malaria nor of carbon tetrachloride among the remedies for hookworm. We had hoped that Dr. Anderson who has collaborated in writing the section on anæsthetics would have given us his views on avertin anæsthesia. Speaking of the specific treatment of pneumonia Dr. Clendening remarks that "There is no specific serum, vaccine or other biologic product which has been demonstrated to be effective, as of this date. We may hope that one will be discovered some day, and when it is, the entire profession, indeed the entire world, will know of it immediately." Despite this confident prophecy the author does not appear to have heard of the work of his fellow-countrymen Park, Cecil, and their colleagues on pneumococcus Type I serum. We have looked in vain for guidance in the use of sanocrysin and allied gold preparations in tuberculosis; synthaline, an oral substitute for insulin of still questionable value, is, however, accorded honourable mention. It is highly probable that America's foremost neurologist would have been pardonably annoyed at seeing his name mis-spelt (p. 419) despite the author's appeal to Horace Walpole—a broken reed—on the subject of errors. We have it on the authority of Pope that alliteration may have its uses, but we trust that in future editions we shall be spared the sentence (on p. 397)....."Probably no mucous membrane menace melts more miraculously."

If Dr. Clendening needed our forgiveness for these trifling peccadilloes he would more than earn it by his eloquent appeal for the claims of rest as a therapeutic agent. Although he does not specifically mention it we hope that the author means absolute rest—not merely the passive act of lying in bed, but freedom from pain, freedom from worries (including relatives), and freedom from the devotees of meddlesome medicine whose misplaced zeal, especially for diagnosis, is such that the patient may be pardoned for imagining that the very hairs of his head will shortly be numbered.

J. M. H.

LECTURES ON DISEASES OF CHILDREN.—By R. Hutchison, M.D., F.R.C.P. Sixth Edition. London: Edward Arnold & Co., 1931. Pp. viii plus 487. Illustrated. Price, 21s. net.

THE sixth edition of this book will be welcomed alike by those who have been fortunate enough to hear Dr. Hutchison's lectures and by those who have not. The new edition is larger than the last; the whole has been revised and three more lectures of importance, viz., on diet after infancy, on asthma, and on chronic splenomegaly, have been added. The first-named, lecture IV, will be of special interest to medical officers of schools. The author emphasises the importance of sufficient feeding and advocates two meat meals a day for the school child. We may quote two passages referring to the growing child:—"In all there is constant competition between the demands of growth and those of the muscles," and "Three adolescent boys will eat as much as four full-grown men and three girls as much as four women."

The lectures are composed from the point of view of the clinician, special emphasis is laid on clinical "guides" and one is constantly coming across points of importance not generally stressed, as for instance, the characteristics of the pure rheumatic throat and the incidence and importance of adenoids in early infancy. Though not a textbook, the range of subjects is wide and there is little that comes within the scope of ordinary practice, with the exception of the infectious fevers, that does not come under notice.

This book will enable the junior practitioner to avoid the many pitfalls of practice among children. He will find the fullest information on such matters as the treatment of acute diarrhœa in infants, the care of rheumatic children, and the diagnosis of the various peculiarities, mental and physical, to which children are subject. Further, the vastly important matter of prognosis has received full attention.

We will go further than saying that this is a book which every student and every junior practitioner should read; they should read it many times and have the precepts laid down ineradicably established in the mind.

E. H. V. H.

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A TEXTBOOK OF PHYSIOLOGY FOR MEDICAL STUDENTS AND PHYSICIANS.—By W. H. Howell, Ph.D., M.D., Sc.D., LL.D. Eleventh Edition. Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1930. Pp. 1099, with 305 illustrations. Price, 30s. net.

HOWELL'S *Textbook of Physiology*, revised and brought up to date, now appears in its eleventh edition. This textbook is so well known and popular amongst medical students and physicians that little more need be done than draw the attention of readers to the publication of this new edition.

As in previous editions, the animal cell and elementary tissues are omitted and relegated to the practical class of histology. Section I begins with the physiology of muscle and nerve. Section VII, which is devoted to the physiology of digestion and secretion, includes not only the endocrine organs but also the organs of excretion. The sections on the central nervous system, on the circulation of blood and lymph, and on respiration, are specially good and comprehensive. Under X-ray examination of the heart, reference is made to the orthodiagraph apparatus for making the rays pass through the chest in parallel lines thus giving a shadow of the exact size of the heart. The value of this apparatus in studying normal and pathological conditions of the heart is explained, as for instance, its use in demonstrating an increase in the size of the heart during muscular exercise. In the section on respiration the effects of low barometric pressure, such as is met with in residence at high altitudes and in aviation, are discussed. These two passing references show the value of this textbook to physicians as well as to medical students.

The only criticism one has to offer is that neither in the index nor in the body of the work is one able to find any reference to the reticulo-endothelial system.

A. C. MACG.

ABDOMINO-PELVIC DIAGNOSIS IN WOMEN.—By A. J. Walscheid, M.D. St. Louis: The C. V. Mosby Company, 1931. Pp. xxiii plus 1000, with 397 illustrations and 1 coloured plate. Price, $12.50 net.

THE size of this book rather repels one, but on taking courage to examine it one finds an excellent index and detailed references, and so it is easy to read up any special point one desires before going right through the work. Much of the matter can be found in smaller and less pretentious books, but it is an excellent book of reference and one which every specialist in gynæcology should possess; on turning over its pages one is reminded of small things likely to be overlooked. The overburdened student will not find it of much help, indeed he will find that most of the methods of examination suggested are followed as a matter of routine in any well-run gynæcological clinic. As in all American books the illustrations and general arrangement make for easy reading. The illustrative cases have all been chosen to lend value and interest to the work.

M. N.

ANTE-NATAL CARE.—By W. F. T. Haultain, O.B.E., M.C., B.A., M.B. (Cantab.), F.R.C.S.E., M.R.C.P.E., M.C.O.G., and E. C. Fahmy, M.B. (Edin.), F.R.C.S.E., M.R.C.P.E., M.C.O.G. Second Edition. Edinburgh: E. & S. Livingstone, 1931. Pp. xi plus 127. Price, Rs. 3-12. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

IT is not surprising to find that a second edition of *Ante-Natal Care* by Haultain and Fahmy was needed so soon, as it is an excellent book to guide all those employed in ante-natal work. It gives the Edinburgh teaching and all the recommendations are good, though every clinic may not agree with all the suggestions. To put off pelvic examination until the second visit is wise advice, as this examination is painful for the primipara, and often prevents her paying a second visit to the clinic and thereby missing examination at the most important period of her pregnancy.

The French have long ago given up detailed pelvic measurements and it is good to meet an English book teaching that the only important measurement is the diagonal conjugate. The chapter on venereal diseases is very good and it would be well if all doctors made up their minds to treat their syphilitic cases during pregnancy and not to waste time waiting for the post-natal period.

The only fault one can find with the book is that it is too short and didactic, but perhaps that is really a virtue.

M. N.

"THE AFRICAN REPUBLIC OF LIBERIA AND THE BELGIAN CONGO," BASED ON THE OBSERVATIONS MADE AND MATERIAL COLLECTED DURING THE HARVARD AFRICAN EXPEDITION, 1926-1927.—Edited by Richard P. Strong. Vols. I and II. Cambridge: Harvard University Press, 1930. Pp. 568 in Vol. I, and from 569 to 1064 in Vol. II. Price, $15.00 the set.

WE cannot but feel that all these "Expedition Results" volumes are unsatisfactory, and we equally sincerely hope that we will never be called on to write one ourselves, at least not on the results of an expedition attempting to cover such an enormous tract of territory.

Had the scope of the expedition, and the report, been confined to the almost unknown republic of Liberia, we could have understood the results being comprised in a single work; the scientific findings, however meagre, would have been a notable contribution to knowledge. But when the work is extended in an attempt to cover the Belgian Congo, a far larger piece of territory, on every aspect of which there already exists an enormous literature, we cannot but feel that the expedition has overreached itself. In our opinion the work should have been entirely confined to Liberia, and any additions made, in the subsequent crossing of Africa, to knowledge regarding the Belgian Congo, should have been written up in a series of separate papers in the appropriate journals.

Part I, about 200 pages, descriptive of the Republic of Liberia, is absorbingly interesting. The Republic, since the date of this expedition, has obtained unpleasant publicity at the hands of the League of Nations on account of its slave-holding propensities, although originally founded under the ægis of the U.S.A. as a home in their original habitat for freed slaves. These, as is well brought out in the report, have degenerated into the indolent, futile, and oppressive masters of a slave-state, maltreating in every way the unfortunate inhabitants of the hinterland under their nominal control, and affording in every aspect of political administration an example of ineptitude that surely cannot be equalled anywhere else on earth. The cry for self-government, for "Africa for the Africans," is as yet less insistent than similar parrot-cries in Asia, and this example of what its realization would mean should convince *Homo sapiens caucasiensis* that his related sub-species *ethiopicus* is only fitted to obey his behests for evermore. With a slave mentality he found him, and no efforts at uplift have succeeded in changing his psychological make-up. Squatting supine on a territory endowed with nearly every natural advantage, he has not, in over 70 years of self-government, succeeded in lighting, paving, or sewering his capital city, in providing more than nominal elementary medical aid for even that city—nor even in building a residence for the head of the State, the presidential palace being hired from a private house-owner!

Part II, Medical and Pathological Investigations, covers some 250 pages. We are not competent to criticise every aspect of this, but if the information on other diseases is as scrappy as that on malaria, to which we naturally turned first, we must conclude that the two authors of this section attempted the impossible. Regarding malaria there is no information whatever as to the prevalence of the three species

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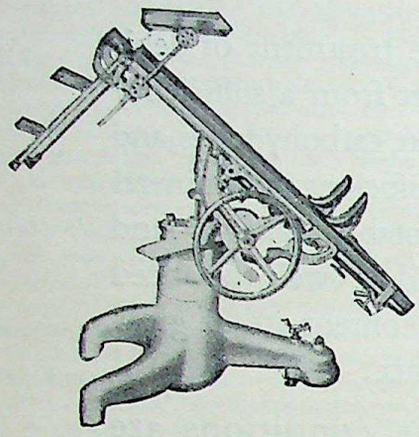

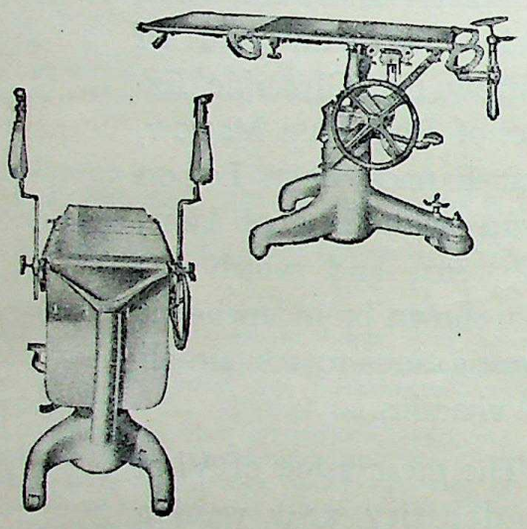

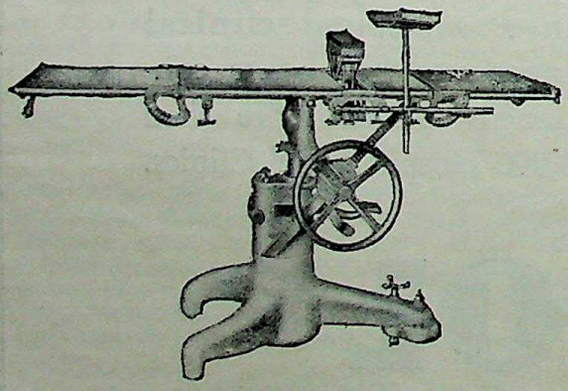

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of parasite, though 156 slides, of which 54 were positive, were taken. Most of the rest of the section on this disease is a discussion of the results of others in various parts of the world, quite out of place in what should be a mere record and discussion of *personal* results. No mention is made of the carrier anophelines at all. In the entomological section in Vol. III a list of the 18 culicidæ collected is given.

Part III, Medical and Biological Investigations, covers 990 pages including the whole of the second volume. The only thing worked out thoroughly is a revision (unfortunately completely unillustrated) of the tabanidae of the Belgian Congo by Bequaert who wrote the large section on entomology in general. The revision occupies over 100 pages, and will be invaluable to any worker on this family in the Congo. It should be in an accessible entomological journal, and not sandwiched into two miscellaneous volumes which only large libraries will be able to afford.

The photographs illustrating the two volumes are abundant and beautiful, and we heartily congratulate Loring Whitman thereon. Large libraries, medical and zoological, will need the work on their reference shelves—individual workers on any subject will do well to save their budgets. There is far too much head-quarter-library compilation and not enough original matter to justify its purchase by any of them.

R. S. W.

Annual Report.

REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1929-1930. LONDON, HIS MAJESTY'S STATIONERY OFFICE. PRICE, 2*s.* 6*d.* NET.

THIS annual report is always of very considerable interest to all engaged in medical research work in the tropics, and our readers may be interested in comparing it with the account of the annual all-India Conference of Medical Research Workers given on pages 335 to 345 of our current issue; the comparison will show the difference in medical research work in the two countries. The British report has been so admirably summarised in the issues of the *British Medical Journal* for March 7th, p. 412 and March 14th, p. 466, that we take the following abstract from that source, with due acknowledgments to our contemporary.

The sixteenth annual report of the Medical Research Council, which was issued this week, records advances in many departments of research, several of which are of immediate interest to general practitioners. The usual annual grant by Parliament of £148,000 was devoted as follows: £86,000 to general scientific investigators, for research work in clinical medicine, and for the work of the Industrial Research Board; £52,000 for the expenses of the National Institute for Medical Research at Hampstead and of the farm laboratories at Mill Hill; and £10,000 for administration. In addition to this grant, financial help for special purposes was received from various sources, including the Miners' Welfare Fund, the Empire Marketing Board, the Dental Board of the United Kingdom, the British Empire Cancer Campaign, the Distemper Research Council of the *Field*, and the Foot-and-Mouth Disease Research Committee. The Council is co-operating closely with the Ministry of Health and the Scottish Department of Health, and is directly represented on the Scientific Advisory Committee set up last autumn by the Secretary of State for Scotland. In the past year Sir Frederick Hopkins and Sir Charles Martin retired from the Council under the terms of the Royal Charter; Sir Charles Sherrington, who retired in 1929, was reappointed, and Dr. J. A. Arkwright became a member.

GENERAL SUMMARY.

The increased responsibility of the Medical Research Council in respect of work within the range of the Therapeutic Substances Act is manifest in the report. Advice has to be given on the routine administration of the Act, and active research work is in progress concerning the preparation and use of standards of reference for the proper assay of biological substances which cannot be measured by direct chemical means. Special attention is also being devoted to the study of the accessory food factors, and it is confidently hoped that in this way Great Britain will play an honourable part in the further development of a branch of medical science which is now receiving special attention in several other countries.

The appointment of Sir Thomas Lewis last June as physican in charge of the Department of Clinical Research at University College Hospital is mentioned in the report as a forward step of the greatest importance, indicating the value of such a research organization; the creation of a position which will appeal to the ambition of younger workers hereafter should stimulate clinical research throughout the country. Somewhat similar appointments are contemplated at Leeds, Birmingham, and Aberdeen, reproducing conditions such as exist already at Sheffield, where the professor of pharmacology, Dr. Edward Mellanby, has had charge of forty hospital beds for the past ten years. Last year the report of the Medical Research Council reviewed the efforts it had made to assist the scientific development of clinical work as such; it is now pointed out that the establishment of such new posts, in which men freed from the claims and restrictions of private practice may devote their whole energies to the advancement of clinical medicine by research within the hospitals, calls urgently for further endowments.

Puerperal infections.

Maternal mortality and puerperal fever have for long engaged the close attention of the Council, and a special committee has been at work supervising the study of streptococci. The concentration of cases for observation has been made more possible at Manchester, where a 50 per cent. reduction in the mortality was thus achieved. In this connection reference is made in the report to the removal of Queen Charlotte's Hospital to Hammersmith, where already a special block for the aggregation and treatment of septic cases has been built and equipped with suitable laboratories for bacteriological and biochemical work. The Council is assisting the hospital in this undertaking; Dr. Colebrook, working in the Council's service, will act as honorary director of the laboratories, and as consulting pathologist will co-operate with the clinical staff. The belief is expressed that definite knowledge is steadily accumulating as regards the adoption of valuable preventive methods, but the curative aspect is less hopeful. Thus Dr. Colebrook has been investigating the efficacy of different methods for the sterilization of the hands in midwifery, and has also revealed the fact that puerperal fever cases not infected with hæmolytic streptococci frequently harbour gas-forming anærobic streptococci.

Nutrition studies.

Much recent work has been devoted to vitamin A, which probably represents a main constituent of the original "growth factor" first demonstrated by Sir Frederick Hopkins in 1912. An ample supply of the special concentrate of this substance has now been obtained by the Council, and carefully controlled possible to test it on a large scale in the prevention of colds during the winter months, under various conditions of indoor and outdoor work. Another inquiry in progress is an examination of the possibility that this vitamin may have some value in the treatment of infective middle-ear disease after scarlet fever, and in the prevention of dangerous infective sequels after investigations will be conducted to determine whether it is really the case that this vitamin has a primary value, both in defending the body against infective diseases and also in promoting recovery after infection has become established. Thus it has already been

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the common infective fevers. Again, at the Dunn Nutritional Laboratory, recently completed and equipped at Cambridge, work has been in progress on carotene, the yellow pigment which produces effects closely resembling those of vitamin A. Pure recrystallized carotene can effectively replace vitamin A in the diet, and it had been concluded that it was stored unchanged in the liver. Dr. Moore, working for the Council in the Dunn Laboratory, has shown that the effects following ingestion of carotene are not due to its being stored in the body, or to any identity with vitamin A, but that carotene in the diet leads to a proportionate appearance of vitamin A as such in the liver fat. His work suggests strongly that carotene is a precursor of this vitamin, and leads to its production within the animal body. This affords an explanation of the fact previously demonstrated by Dr. Moore that the carrot, which contains carotene in abundance but no vitamin A as such, can give rise to the production in the animal body of as much vitamin A as that contained in an equivalent weight of cod-liver oil, calculated as dry substance.

Progress has also been made in the standardization of vitamin preparations. The discovery, made in the Council's laboratories at the National Institute, of the method of producing vitamin D artificially from ergosterol has led to its manufacture on an extensive scale, its issue in many forms for therapeutic use, and its addition to many types of food materials. An attempt to indicate the degree of activity of various such preparations has led to the appearance of several unofficial so-called "units," with no clearly defined relations. It was accordingly arranged to maintain at the National Institute a standard solution of irradiated ergosterol to facilitate the comparative estimation of vitamin D. The unit of this vitamin was defined as the antirachitic potency of a quantity of the first-named preparation, corresponding to 0.0001 mg. of the ergosterol used in its production. Methods were devised for thus estimating vitamin D, and supplies of the standard material were made available for general distribution to approved users last August, since when samples of the standard have been sent to twenty-eight institutions in Great Britain and to eight other countries. To promote the studies necessary for the establishment of other standards, sub-committees have been already formed by the Accessory Food Factors Committee to deal with vitamins A, B, and C; they are actively at work.

Alcohol and fertility.

An experimental estimation of the effect of alcohol on the fertility of guinea-pigs has just been concluded at the National Institute, after having continued for nine years. In 1913 and 1914 Professor Stockard, in America, published the results of a similar experiment, his records seeming to prove that the daily administration of alcohol in quantities large enough to produce visible intoxication, but not otherwise to impair the health of the parents, caused a fall in the number of births, an increased liability to stillbirths, and the production of weakly and defective offspring. A still more serious point was that these tendencies appeared to be inherited, so that without further exposure of the stock to alcohol the proportion of animals showing weakness and deformity continued to be high in later generations. Stockard's results clearly suggested that alcohol in the circulation could injure the germ plasm, and bring about permanent deterioration of the race, even without obvious injury to the generation directly exposed. It was unlikely that alcohol would be the only poison acting in this deferred way; it was, indeed, quite possible that any circulating poison, such as those occurring in the acute infections, might inflict similar damage, only recognizable in later generations. So grave a threat to the future of humanity necessitated the careful repeating of Stockard's experiments, and this has now been done.

Miss Durham, using a specially chosen stock of guinea-pigs, has followed exactly Professor Stockard's lines, full controls being maintained. The diet was standardized for all the animals, care being taken to ensure an adequate ration of the essential vitamins. The results were statistically analysed, but no confirmation was obtained of a single essential point of Stockard's findings. The litters obtained from alcoholic parents, or from their descendants, were as numerous as those from the control matings; there was no excess of stillbirths or deformity. Their offspring for several generations exhibited no transmitted defects of the kind described by Professor Stockard, from which it appears that those defects were not attributable to the alcohol. This section of the report closes with the pertinent remark that "these negative findings have no relation whatever to the effects of alcoholic parentage on the upbringing of children in an organized human society."

THE NATIONAL SUPPLY OF INSULIN.

Since 1922 the Medical Research Council has taken an active part in promoting the manufacture, availability, and clinical use of insulin in Great Britain, and a section in the report under review is devoted to a particularly important survey of some of the prevailing conditions of its administration. At first the supply fell short of the demand, but in 1923 the position was reversed, and since that time there has always been a sufficiency for the medical practitioners in this country, and a surplus for export. Early in 1930 the consumption of insulin in Great Britain was 50 per cent. greater than at the corresponding period in 1928, and nearly four times the figure for 1925. It is thus apparent that very many patients in 1925 needing this remedy were not receiving it; moreover, the present figures indicate that it is still being inadequately used, and this accounts for the disappointing slowness in the rise of its consumption since 1923. It is probable also that a large number of patients are not receiving insulin under proper conditions of biochemical control and dietetic balance, for there is a sharp discrepancy between the recorded success at all the chief medical institutions and the apparent steadiness of the death-rate from diabetes for the country as a whole. This failure to diminish the death-rate has been used as an argument against the value of insulin, despite the indisputable evidence of its life-saving properties, which is a matter of common knowledge to all practitioners. The death-rate seems, in short, to demonstrate the failure of insulin, and yet there is ample clinical evidence to the contrary. This contradiction is examined critically in the report.

Since the war diabetes has apparently become commoner. Death certificates record the contributory as well as the immediate causes of the actual fatal termination, and the patient with an incurable disease is likely to be certified as dying from it, even if death is actually due to an intercurrent disease, or occurs at an advanced age. It is often forgotten, especially by prejudiced propagandists against such preparations as insulin, that it does not pretend to afford a cure, but only to prolong life, and to restore some considerable measure of health. Yet, even so, there should still be recorded some diminution in the deaths from diabetes at earlier ages; and this is actually the case, though not to the extent that might reasonably have been expected, had this preparation been used freely. In the Registrar-General's statistical review for England and Wales for 1928 it is stated that since the introduction of insulin in 1923, the mortality of males with diabetes under the age of 55 has been reduced by 37 per cent., and that of females by 21. The male rate for the period 25 to 45 has fallen by 45 per cent. But this fall is masked in the total death-rate by a concurrent increase in the mortality at ages over 55, which for males almost neutralizes, and for females outweighs, the reduction in earlier life. This increase, adds the Registrar-General, has evidently a dietetic origin, since

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THE MINERAL CONTENT has received attention, particularly the iron. "The difference in the iron content of cow's and human milk is marked and a serious deficiency can occur" says an article in the Glasgow Medical Journal. The iron content of Glaxo has been adjusted accordingly to the amount necessary for the growing infant.

VITAMIN D IS ESSENTIAL to the infant in a sufficient quantity: cow's milk, from whatever source, is deficient or lacking in this vitamin—a matter of recognised knowledge. A standard quantity of vitamin D is added to the new Glaxo to bring it to the necessities of the human infant.

CONTINUOUS CONTROL over every factor in manufacture and also laboratory and clinical investigation into every problem in infant nutrition; this is the Glaxo Policy. In this way the confidence of the medical profession throughout the world has been gained and kept.

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WITH ADDED VITAMIN D

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Further information from

H. J. FOSTER & CO. LTD.

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NATURALLY RICH IN VITAMIN "D"

Vitamins

AND DRIED MILK

THE vital importance of an adequate supply of vitamins in the feeding of infants is now well recognised, not only in the prevention of obvious deficiency diseases such as rickets and scurvy, but also in the maintenance of the general resistance against the common infections of the respiratory, alimentary, and urinary tracts, and the determination of a normal equilibrium between the various endocrine secretions.

Cow & Gate Milk Food

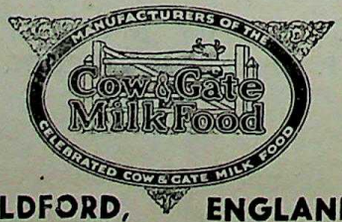
"Cows' Milk made safe and suitable for Baby."

The vitamin content of milk depends, in the first instance, on the character of the diet supplied to the cows. English pasture-fed herds furnish a milk superior in its vitamin content to that of stall-fed animals, or those fed on inferior pastures of dry and tropical climes. The Cow & Gate dairy farms and laboratories are situated in the rich pastures of Somerset and Dorset, and thus a high vitamin content of their milk is assured, obviating the necessity for the addition of synthetic vitamin concentrates, which are very doubtful in their action.

The survival of the vitamins in the dried product depends on the process employed. The Cow & Gate Roller process of drying milk involves exposure to heat for a matter of seconds only, with the result that the vitamins are for all practical purposes intact.

There have been no proved cases of rickets where Cow & Gate Milk Food has been used. Many feeding experiments in the hands of well-known investigators have demonstrated that adequate nutrition and growth are assured on a diet of this food, which has now been widely recommended by the Medical Profession for over a quarter of a century.

The makers will gladly supply samples for Clinical test and any further information required, and wish to remind Members of the Medical and Nursing Professions that the Cow & Gate Laboratories are always at their disposal for experimental work in connection with Milk Foods, and that they will be delighted to arrange visits to their factories in the West of England at any time.

COW & 

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the mortality at these more advanced ages was greatly reduced during the war, and has been rising again since 1918. It is pointed out, therefore, in the report of the Medical Research Council, that the inevitable conclusion is that the general use of insulin throughout the country has been advancing only gradually, and is still below the level of the maximum need. The increasing mortality among elderly diabetics, for whom insulin treatment is less frequently used, indicates an absolute increase in sufferers of this type; moreover, the number of deaths among the older patients must naturally increase with the extension of life among the younger sufferers from this complaint.

Such considerations are obviously of great practical importance, and once again there is presented a tragic example of the delay which occurs between the introduction of a new remedy and the time when the community as a whole is educated sufficiently to reap the full advantage of the discovery. The Medical Research Council has done well to direct attention to these facts; it proposes to inquire during the present year into the results of insulin treatment at special centres, with a view to defining more precisely the standard of success attainable under the best conditions, and so to measuring the results obtained for the country as a whole.

WORK AT HAMPSTEAD AND MILL HILL.

Virus infections.

Captain Douglas and Dr. Wilson Smith have found that the blood and tissue cells of a normal animal possess a limited power of killing the vaccinia virus outside the body, a power due to a normal constituent of the serum which is easily destroyed by heat. The blood and tissue cells of an animal rendered immune to vaccinia were found to have acquired a greatly enhanced lethal activity towards the vaccinia virus. The washed tissue cells have, by themselves, an increased power of killing the virus, but it is clear that a specific antibody in the serum must contribute largely to the total effect. Dr. Wilson Smith has shown that each of the viruses of vaccinia and herpes absorbs from a mixture of the two corresponding antibodies its own specific antibody, leaving the other intact. Dr. Andrews has been able to demonstrate that the union of the antibody of fowl plague with its antiserum becomes firmer with time, after being at first dissociable by dilution. At the ordinary room temperature some days may be required for this fixation—an interesting observation in view of the fact that immediate susceptibility to a virus may be conferred by injection of its specific antibody into a living animal. He has also found that the herpes virus is prevented from infecting normal cells when these are cultivated in the presence of an immune serum; on the other hand, cells from an animal immunized to herpes are susceptibility to infection by this virus if cultivated in normal serum. Dr. Wilson Smith has been able to confer on a definitely neurotropic strain of herpes virus the power of infecting the skin, and of producing reactions even in high dilutions.

Dr. P. P. Laidlaw and Mr. G. W. Dunkin have been investigating difficulties which have arisen in the practical immunization of dogs against distemper. After very successful results had been reported for some months it was discovered that in an increasing number of cases the expected immunity was not making its appearance. The processes of the preparation of both the virus and the vaccine were carefully scrutinized, and certain faulty details were brought to light and remedied. Preventive inoculation on a large scale will shortly be resumed, it is stated, with fuller knowledge and greater security. These two investigators have also been studying the complement-fixing antibody in the blood serum which confers immunity on a dog which has recovered from an infection with distemper or has been artificially immunized. A possibility of standardizing the strength of both the virus and the vaccine seems to be now in sight, and also an improved method of preventive immunization which can be applied on a single occasion, obviating the need of repeating the injections.

Drs. Gye and Purdy have continued their work on the malignant tumours of birds and mammals, with special reference to the transmission of a myxosarcoma of the fowl by cell-free filtrates. The nature of immunity to certain types of tumour growth is being followed up, and in close co-operation with Dr. Andrewes it has been shown that the blood of a fowl which is offering good resistance to a slowly growing fibrosarcoma is particularly rich in antibodies which neutralize the infective property of filtrates from rapidly growing fowl tumours of quite different histological types. This evidence that the infective agents, producing fowl tumours of widely different types histologically, may be similar antigenically is highly suggestive.

Dr. Perdrau has been proceeding with his studies of a group of diseases of the brain and spinal cord which are characterized by the loss of the myelin sheath of nerve fibres. Although some of these conditions occur as a sequel to general infections by known viruses, such as the encephalitis which has followed vaccination in a small percentage of cases, Dr. Perdrau has in no instance been able to detect the virus in the nerve tissues. The hypothesis that the cause is a latent virus, which is awakened to activity by an acute infection, is being tested. Dr. Carmichael is investigating the possibility of the presence of a virus in the spinal fluids of patients suffering from disseminated sclerosis, and Mr. Galloway is co-operating with Dr. S. Nicolau of the Pasteur Institute in Paris on the conditions affecting the stability of the Borna virus of the enzootic encephalomyelitis of horses, cattle, and sheep.

Amœbic dysentery.—Mr. Clifford Dobell, who has been studying the organism of amœbic dysentery at the Institute for six years, has been publishing at intervals his discoveries with regard to the varieties of *Entamœba histolytica* met with in man and monkeys. He has been able by assiduous care to isolate any desired strain of this amœba from a man or a monkey, and to maintain it in artificial culture for any period; to obtain any stage in its life-history—for example, encystment—in the laboratory at any chosen time; to introduce it naturally to a fresh simian host; and to eradiate it at will by therapeutic means. Either the simian or the human strain can be shown to produce amœbic dysentery in kittens. Host and parasite can therefore be separated or united, and again separated, at will, and any desired experiment can be made with either or with both combined. No such power of control has yet been obtained with any other human or animal endoparasite.

Determination of biological standards.—The work of this kind now in progress includes the sterility testing of more than 100 varieties of catgut; the standardization of vaccine lymph; the assaying of a dried antiserum for the toxin of *B. welchii* and of antidysentery serum; the estimation of strophanthus tinctures; and the testing of the toxicity and potency of every batch of products of the arsenobenzine group made in this country.

WORK AT OTHER CENTRES.

At the James Mackenzie Institute for Clinical Research, St. Andrews, Dr. A. Rowand is investigating 500 children in respect of their family history and environmental conditions, diet and general nutrition, dental disease, and sickness incidence. Records of 232 children are already complete, and are being analysed. A direct result of this inquiry has been the formation of a child welfare centre at St. Andrews, with special facilities for the continued observation of these children. Concentrated pneumococcal serum is being tried in pneumonia patients in London and Edinburgh; very favourable results have been reported from America following the use of this serum, but it is as yet too early to draw conclusions in Great Britain. At Sheffield Professor Mellanby and Dr. Roberts are studying the

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effects of carotene and vitamin A in pneumonia, rheumatic fever, and other infections. The part played by this vitamin in preventing the neurological changes in ergotism is also receiving attention, and an attempt is being made to discover the effective chemical factor in ergot. Dr. G. H. Oriel at Guy's Hospital, continuing his study of the allergic states, has obtained evidence that the "proteose" isolated from the urine in asthma and urticaria contains the specific antigen to which the patients are sensitized; encouraging clinical results have been obtained by desensitization. At St. Bartholomew's Hospital Dr. R. Hilton has made further observations on the effects of deep *x*-ray therapy on the lungs. Acute lesions are produced, but no appreciable fibrosis was discovered, even at the end of five months. If the lung has been previously collapsed by pneumothorax the effects of radiation are reduced.

The incidence of rheumatic heart disease is being investigated at Bristol by Dr. Carey Coombs, with special reference to the influence of soil and locality. The ætiology of acute rheumatism is being studied by Dr. R. C. Lightwood in Kensington, and a rheumatic supervisory centre has been conducted at the Princess Louise Hospital for Children, where careful inquiry is being made into the possibly predisposing home and family conditions. The Council is assisting also an intensive search, now in progress at Great Ormond Street Hospital, into the ætiology and treatment of rheumatic fever. At Guy's Hospital Dr. E. C. Warner is studying the nutritional history of children with rheumatic diseases. The vitamin food content of various Empire food substances is being determined at the Lister Institute, and a report has been published by the Council on the vitamin C content of apples. Dr. L. J. Harris, at the Dunn Nutritional Laboratory, Cambridge, has continued his work on the effects of overdosage with vitamin D, and in collaboration with Dr. A. N. Drury has made further studies of the relation of vitamin B deficiency to heart function. An inquiry into the changes in tooth structure produced by erosion, injury, and caries is being continued by Dr. E. W. Fish, and it has been found that the lymphatic tubules of the dentine, when injured, become isolated from the tooth pulp by a formation of "secondary dentine," and from the surrounding normal tubules by a local deposition of lime salts. Further studies of the response of dentine to injury have been made at the London Hospital by Mr. E. Sprawson, who has also been examining the changes in the lime salts of tooth enamel produced by injury and advancing age.

An exhaustive investigation of the common form of Raynaud's disease has been in progress at University College Hospital under the supervision and active direction of Sir Thomas Lewis. It has been shown now that the affected vessels are still capable of expanding fully, or almost fully, under suitable conditions, and that the veins do not ordinarily become closed in spasm. The arteries behave abnormally when there are changes in the local temperature, this being a direct reaction, due to a peculiar condition of the vessel wall and not to a vasomotor nervous reflex. The state of the vasomotor nerves naturally influences the tone of the vessels in these patients, as it does in normal people, but the pathological element in the vascular spasm is not of nervous origin. Another mechanism, demonstrated in this connection, is the vaso-dilatation in the skin of the finger after it has been immersed in cold water for five to ten minutes. This reaction has also been obtained in the ears and other parts of the face. It is independent of the sympathetic nerves, but is dependent upon the sensory nerves, and due to an axon reflex in them. This mechanism, which is brought into frequent play during cold weather, has an important function in protecting exposed parts of the skin from excessive cooling and resulting injury. Sir Thomas Lewis has also compiled the results of many years of observation of cardiac failure of the congestive type, with a view to showing how the stages of this malady may be recognized by simple bedside tests.

Correspondence.

THE ECONOMIC VALUE OF MEDICAL INSTITUTIONS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—With the awakening of the masses and the grant of liberal institutions, the desire to give the newly found wings of public opinion a trial is nowhere more noticeable than in the deliberations of local bodies. This trial has now developed into an economic battle and he would be a poor protagonist of debate who cannot support his criticism with rupees, annas and pies.

It is a happy sign of the times that the criticism occasionally may be of the nature of a sincere effort to learn, sometimes it may be ill-founded but it is rarely of a carping nature. Such were the reasons for delving into some of the figures that are detailed below; they were ultimately not required, since the countryside cousin has his head screwed on in the right place; he is gifted with a tremendous amount of common sense and he realises the part played by the medical institutions in the economics of the countryside. No objections were accordingly raised to the so-called exorbitant demands made by the medical department. Nevertheless the figures are illuminating enough to see the light of the day.

The expert in economics is never tired of enunciating that the real wealth of the country consists of the amount of actual labour ready and available for use. He is again in the habit of comparing the national wealth of the country to a huge storage tank of water with numerous affluents for the water to flow into and again numerous affluents for the outflow of water. According as the quantity of water flowing in is greater than that going out the water level in the tank rises and the reverse is equally correct.

The above is equally true of the coffers of the local bodies and each one of the small channels of water above referred to will in that case be the number of working days put in by each worker during the year. The fact that the medical institutions save these small channels that go to swell the water in the tank from being absorbed on the way is the contention worthy of note.

The activities of a modern medical institution are indeed numerous, but for our purposes for the moment we will concern ourselves with one or two of the amenities that are available in most of the hospitals in this district. The total number of out-door cases dealt with during the year in all the medical institutions in the district is in the neighbourhood of 700,000. Of these only one-third (233,000) belong to the category of bread winners, the remainder being women and children. On the average, if Nature is left to establish a cure even in a simple disease like malaria, it may take weeks even months to do so, but let us take the more conservative figure of 7 days for our purpose. About 24 hours are usually enough to cinchonise a patient, but even then let us take as many as 4 days for establishing such cinchonisation. As many as 3 working days per patient are saved to the district as the result and the total saving in the number of working days comes to 699,000 or the sum of Rs. 2,60,000 taking the average daily wages of a labourer at 6 annas. For half that sum you will agree that to have the luxury of hospitals and dispensaries for the whole year is not a bad investment after all. But let us look into another of the activities of these institutions and apportion if possible a cash value to the same. We in the district specialise in eye operations and our figures for removal of cataractous lenses alone come to 5,700 for the year in nearly 4,000 patients. Given each of these patients 10 years lease of average active life we add under this heading alone 4,000 × 365 = 1,460,000 working days to the district pool. One whole-time attendant per head, a necessity otherwise, is thereby set free to work and that brings the total to double

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"Bayer-Meister Lucius"

'PYRAMIDON

The reliable

Analgesic - - It affords rapid relief in pain of varied ætiology, neuralgia, toothache, earache, etc.

Antirheumatic In all rheumatic affections including gonorrhœal arthritis.

Antipyretic - In all acute febrile conditions, including influenza, erysipelas, etc., almost a specific in Measles (according to Brit. Med. Journ., December 1929.)

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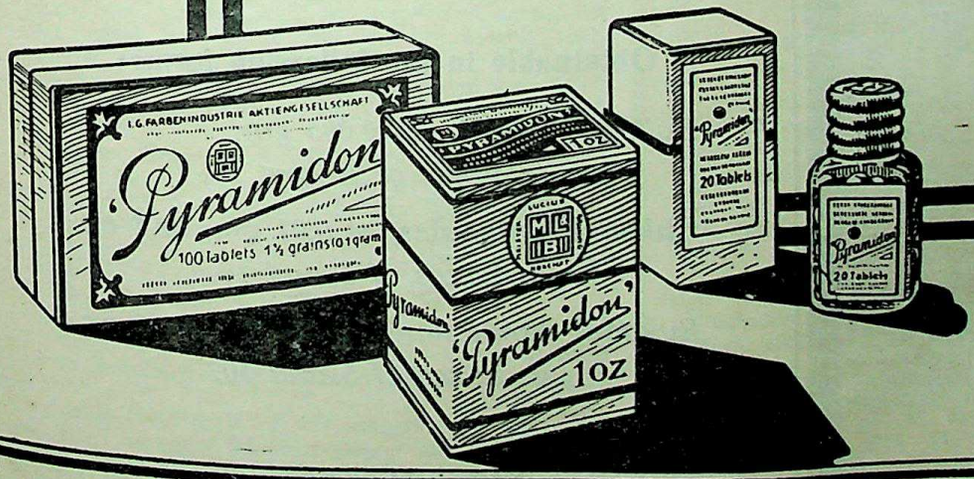

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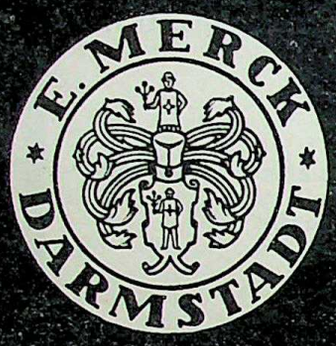
EUKODAL



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Substitute for Morphine

Eukodal possesses a powerful analgesic action, although small doses are perfectly adequate

Eukodal is the analgesic for cases in which morphine is not well-borne

Eukodal may be prescribed in all cases where morphine is indicated

Obtainable in the following forms:

Eukodal Tablets, of 0.005 gm. in tubes of 10 and 20.

Eukodal Ampoules, of 0.01 gm. in 1 c.c., in boxes of 5 and 10.

Eukodal Ampoules, of 0.02 gm. in 1 c.c., in boxes of 5 and 10.

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the above figure and again on wage basis, to the colossal sum of rupees ten lakhs. This benefit recurs for 10 years.

The above figures are startling and yet they refer to cataract alone. No account will be taken of the other numerous indoor activities. Nor is it considered necessary to refer to the fight put up by medical institutions against the numerous epidemics the credit for which must go to the sister department. Even so the contingency is not unknown in India. Nor do I touch on the humanitarian side of the work, although the choicest gift of God, in our search for facts and figures. The profession is considered the noblest in the world in its attempts to relieve pain but even that perhaps is mere sentiment.

We have but dealt with one-third of the outdoor figures though. The remaining two-thirds—470,000—may not be actual bread winners but they include mothers of to-day—and their tale of woe and suffering reminds you of mediæval times—and bread winners of to-morrow, in them being centred the future hopes and the wealth of the country. Apportion them as you like it stands to reason that the slightest little accident to eye, hands or legs may leave the future bread winner of the district blind, maimed or crippled for the rest of his days and even a burden to society. If the medical institutions can accomplish but a hundredth of what they assert in the direction of reducing the above disabilities, would it not be worth while to pay the paltry sum of a lakh and half of rupees for such an assurance alone?—Yours, etc.,

JAMAL-UD-DIN,
MAJOR, I.M.S.,
Civil Surgeon.

FEROZEPORE,
1st *April*, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

THE services of Lieutenant-Colonel R. N. Chopra, M.A., M.D., have been replaced at the disposal of the Government of Bengal, with effect from the 1st April, 1931.

The services of Lieutenant-Colonel R. E. Flowerdew have been placed at the disposal of the Government of Bengal for employment as Inspector-General of Prisons, Bengal, with effect from the 9th March, 1931.

Lieutenant-Colonel F. E. Wilson, M.B., has been appointed as permanent Inspector-General of Civil Hospitals, Central Provinces, with effect from the 7th February, 1931.

Lieutenant-Colonel M. A. Nicholson has been posted as Civil Surgeon, Ajmer, and Chief Medical Officer, Rajputana, with effect from the 20th March, 1931.

Lieutenant-Colonel H. H. Thorburn, C.I.E., M.B., has been appointed as Surgeon on H. E. the Viceroy and Governor-General's Personal Staff, with effect from the afternoon of the 18th April, 1931.

Lieutenant-Colonel A. N. Dickson, M.C., M.B., has been posted as Residency Surgeon and Chief Medical Officer in Baluchistan, with effect from the 31st March, 1931.

Lieutenant-Colonel R. F. D. MacGregor, M.C., has been posted as Chief Medical Officer in Central India and Residency Surgeon, Indore, with effect from the 8th April, 1931.

Lieutenant-Colonel P. S. Mills, M.B., B.S., D.T.M. & H., M.R.C.S., has been appointed to officiate for Lieutenant-Colonel L. Cook.

Major R. Sweet, D.S.O., M.B., has been appointed to officiate for Major E. S. Goss.

Major L. K. Ledger has been appointed to officiate as Political Agent in Bundelkhand, in addition to his own duties, with effect from the 11th March, 1931.

The services of Major M. Das have been placed at the disposal of the Government of Bengal for employment in the Bengal Jail Department, with effect from the 17th March, 1931.

Major R. V. Martin, I.M.S., Superintendent, Yeravda Central Prison, to officiate as Inspector-General of Prisons, *vice* Major Doyle, granted leave.

Major M. G. Bhandari, I.M.S., Superintendent, Nasik Road Central Prison, to be Superintendent, Yeravda Central Prison, *vice* Major Martin.

The services of Major A. C. L. O'Shee Bilderbeck, M.B., B.S., M.R.C.S., D.P.H., D.T.M. & H., have been placed permanently at the disposal of the Government of Bombay, with effect from the 20th July, 1930.

The services of Major P. H. S. Smith, M.B., have been placed temporarily at the disposal of the Government of Bombay, with effect from the 1st April, 1931.

Major R. Hay has been posted as Residency Surgeon in Kashmir, with effect from the 2nd April, 1931.

Major W. C. Spackman, M.B., B.S. (Lond.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.C.S.E., D.T.M. (Lond), I.M.S., officiating Civil Surgeon, Surat, to officiate as Civil Surgeon, Poona, *vice* Lieutenant-Colonel R. F. Steel, I.M.S., proceeding on leave.

LEAVE.

Lieutenant-Colonel G. M. Millar, O.B.E., an Agency Surgeon, has been granted leave for 7 months and 16 days, with effect from the 20th March, 1931.

Lieutenant-Colonel L. Cook, C.I.E., M.B., F.R.C.S., Officiating Inspector-General of Civil Hospitals, Bihar and Orissa, has been granted combined leave for 4 months, with effect from the 10th April, 1931.

Lieutenant-Colonel R. F. Steel, M.B., B.ch. (Dub.), F.R.C.S.E., I.M.S., Civil Surgeon, Poona, is granted leave on average pay for 4 months and 13 days, and in continuation, leave on half average pay for 5 days, with effect from the 11th March, 1931, or subsequent date of availing.

Lieutenant-Colonel V. B. Green-Armytage, I.M.S., Professor of Midwifery, Medical College, Calcutta, and Obstetric Physician and Surgeon, Medical College Hospital, is allowed leave for the period from the 28th March to 4th July, 1931 (both days inclusive).

Major E. S. Goss, M.C., Assistant Director-General, Indian Medical Service (Stores), has been granted combined leave for 1 year, with effect from the 7th April, 1931.

PROMOTIONS.

Lieutenant-Colonel W. R. J. Scroggie, C.I.E., has been promoted to the rank of Colonel, with effect from the 2nd January, 1931.

The promotion of Major A. I. Cox to the rank of Major has been ante-dated to the 14th July, 1930.

The undermentioned Officers have been promoted from the rank of Captain to that of Major, with effect from the dates noted against their names:—

M. K. Kalavkar, M.B.E., M.B., 18th February, 1931.

H. M. Strickland, M.B., 22nd March, 1931.

Lieutenant H. S. Waters, M.B., has been promoted to Captain (provl.), with effect from 4th February, 1931.

RETIREMENTS.

Lieutenant-Colonel H. B. Steen, M.B., has been permitted to retire, with effect from the 23rd November, 1930.

Lieutenant-Colonel F. C. Rogers has been permitted to retire, with effect from the 1st March, 1931.

Lieutenant-Colonel W. F. Brayne, M.B., has been permitted to retire, with effect from the 4th March, 1931.

Lieutenant-Colonel W. O. Walker, M.B., F.R.C.S.E., has been permitted to retire, with effect from the 13th March, 1931.

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Notes.

GLANDULAR PREPARATIONS, LTD.

GLANDULAR PREPARATIONS, LTD., are an Australian firm, whose address is 65, Macquarie Street, Sydney, N.S.W. They have brought to our notice three of their products which are now on the Indian market for the treatment of anæmia, sprue, etc. The first is "Genlin," a desiccated stomachic tissue, prepared from officially certified material, tasteless and odourless, and put up in 4 oz. bottles. This should be administered in fruit juice. The second is "Hepabos," which is stated to be desiccated ox-liver, one part of the powder being equivalent to five parts of fresh liver. The third is "Sang-Cre," which consists of desiccated ox-liver tablets. These are sugar-coated, and the preparation is a very elegant and palatable one.

A report from the Presidency General Hospital, Calcutta, states that a generous supply of these three preparations was received some time ago from the makers, and was tested; "the staff of the hospital is able to report that these preparations are satisfactory and efficacious, and are in every way equal to other preparations of a like nature."

The following is an abstract from a report on these preparations in the *Medical Journal of Australia* for October 4th, 1930:—

'"Hepabos" and "Genlin" are the names of two products of Glandular Preparations, Limited. They are respectively liver extract and gastric tissue extract. It is claimed that they contain the active principle or principles efficacious in the treatment of Addisonian or pernicious anæmia.

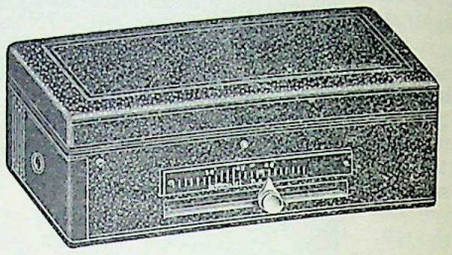
An inspection has been made of the premises of the firm and the process of manufacture has been investigated. The cleanliness of the operations was of a high order. The raw material is passed by government authorities. The product has very little taste or odour.

In order to determine whether any active principle had been lost by solution in the residues the following experiment was undertaken. The residue from sixty pounds of raw material *plus* sixty pounds of acetone, which amounted to ninety-three pounds, was evaporated down *in vacuo* at a temperature not exceeding 100°F. The residual liquor was then 1,400 cubic centimetres and, of course, would contain the whole of the active principle which was dissolved out with the acetone. To this residual liquor was added alcohol so that the percentage of alcohol was 70, in which percentage the active principle is readily soluble. The mixture was agitated each day for four days and then filtered. The precipitate was rejected and the filtrate was divided into three lots. One lot was made up to 95 per cent. alcohol and was violently agitated at hourly intervals for six hours. A second lot was made up to 95 per cent. alcohol, kept at 37°C. and was violently agitated for six hours. The third lot was made up to 96 per cent. alcohol and kept at room temperature and violently agitated for some hours. In none of these three portions had any precipitate developed after some days. It can thus be claimed that the solvent used dissolves no substance which is insoluble in 95 per cent. alcohol, but soluble in 70 per cent. alcohol.

According to clinical reports satisfactory results have been obtained in pernicious anæmia by the use of "Hepabos" and "Genlin." Sometimes these have been used in a mixture of 75 per cent. of the former and 25 per cent. of the latter. These substances may be regarded as reliable products and suitable for use in the treatment of Addisonian anæmia. "Hepabos" is also marketed in tablet form under the trade name of "Sang-Cre."'

THE HALOMETER.

THE Eve's Halometer referred to in Major Colin McIver's article in our April number is stocked in India by Messrs. Lawrence & Mayo, Ltd., and can be obtained at any of their branches. The following is a description of the apparatus:—



This clinical instrument has been designed to enable the practitioner to measure the average size of the red cells quickly and easily, and thus to make an early diagnosis of pernicious anæmia and allied conditions. It consists of a tiny electric bulb the illumination of which (by a battery included in the instrument) is regulated by a graduated switch until it is just white and no longer reddish. The whole is encased in a small black box with a hole at one end against which the blood smear is clipped and through which the light is then seen surrounded by a coloured halo. To facilitate the estimation of the diameter of the halo it is duplicated by reflection from a pair of inclined mirrors, and the movement of a knob along a scale at the side of the box causes the haloes to approach each other until their red edges are just brought into contact. The scale now records a measure of the diameter of the halo. The calibration gives the angular measure of the halo, but the reading can be converted into the average size of the red cells by reference to a printed table. Except for comparison with other methods this is redundant, as the limits of normal blood are clearly indicated on the scales.

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Original Articles.

ANÆMIA OF PREGNANCY.

By SUBODH MITRA, M.D. (Berlin), M.B. (Cal.), F.R.C.S. (Edin.),

Superintendent, Chittaranjan Seva-Sadan, Calcutta.

Historical sketch.

In the year 1854, three cases of anæmia of pregnancy, then known as "puerperal chlorosis," were described by Lebret of Switzerland. This is the earliest record of the anæmia of pregnancy in the literature. Five cases were mentioned by Gusserow during the years 1868 to 1871. Biermer gave a clinical picture of the anæmia of pregnancy in 1872, and Ehrlich diagnosed the condition as pernicious anæmia after a thorough blood examination. Esch (1921) of Marburg University collected 23 cases in 1917 from the German literature of the previous 20 years.

In the Vienna Maternity Clinic, only two cases were observed among 30,000 labour cases during the years from 1891 to 1901; and since then up to 1920 only 6 cases were noticed among 60,000 labour cases (Beckman, 1921).

Anæmia of pregnancy is also rare in the United Kingdom. Only 1 in 12,000 cases reported from the Rotunda Hospital, Dublin, during 1921-1923; and 1 in 1,800 cases in Queen Charlotte's Hospital, London, in 1923; and not a single case was observed in the Simpson Memorial Hospital, Edinburgh, among 1,400 cases in 1923. Bardy in 1924 published 68 cases collected over a period of 38 years from the medical literature of Europe and the United States.

In glaring contrast to these occidental statistics, we find anæmia of pregnancy very common in India. Balfour (1927) observed 150 cases in Bombay (1925-1927) and McSwiney (1927) recorded 43 cases from the Eden Hospital, Calcutta, among 2,544 cases (1923-1925). During the last 4 years (1926-1929/30), we have had 86 cases in the Seva-Sadan Women's Hospital, Calcutta, the total number of labour cases being 1,883.

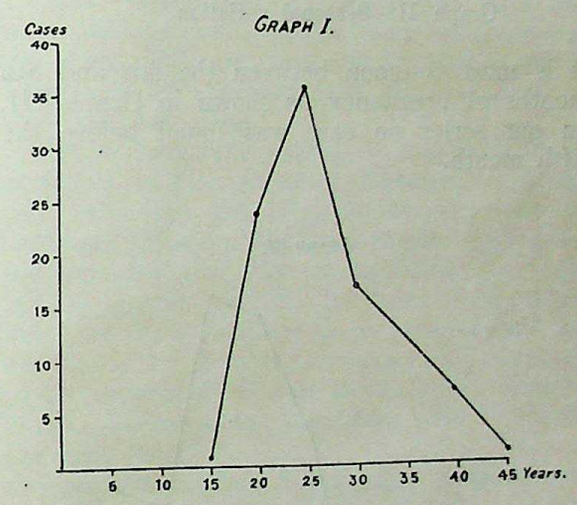
Clinical features.

Anæmia is a general and inexact term which may include one or more different changes in the blood, but of which the main criterion clinically is diminution in the amount of hæmoglobin contained in a given volume, usually associated with a decrease in the number of red cells per c.mm. of blood (French, 1917). The usual red blood corpuscle count in a healthy adult female under the climacteric age is 4½ millions and the hæmoglobin value is 81 per cent. (McCay, Castellani, and Chalmers).

Anæmia of pregnancy is a special type of anæmia, always associated with pregnancy, and in favourable cases it disappears with the termination of pregnancy prior to which there are no remissions. There is usually no recurrence even in subsequent pregnancies. It is aplastic in form, and differs from pernicious anæmia by (*a*) absence of marked remissions and exacerbations, (*b*) shorter duration, (*c*) being always associated with pregnancy and terminating with it, and (*d*) occurring comparatively at a younger age.

Community.—The patients of our series are mostly Hindus. Only 7 were Mohammedans, of whom 5 died (i.e., a mortality of 71 per cent. among Mohammedan patients).

Age.—Anæmia of pregnancy occurs at any age between 15 and 40, but the greatest frequency is at the 25th year as shown in our series (Graph I). It is rarely seen below 15 or above 40.



Graph I.—Incidence of age.

Parity.—Multiparous women are more commonly affected. Sixty-six of our cases (i.e., 76.7 per cent.) are multipara. In Balfour's series 71 per cent. are multiparous. There were no signs of disease in previous pregnancies, nor have the subsequent ones been affected.

Seasonal variation.—The disease is more common during the second half of the year, between July and December (Graph II). Balfour suggests that this seasonal incidence depends on gastro-intestinal disturbances, which are more common in the latter half of the year. Of 38 diarrhœic cases in our series, there were 12 in the first half and 26 in the second half. Balfour had 11 in the first half and 33 in the second half. It is a known fact that most of the toxæmias of pregnancy occur during the second half of the year. There may be some factors in this part of the year which favour the production of toxins in the body.

Prematurity.—It is uncommon to find anæmia of pregnancy during the early part of gestation.

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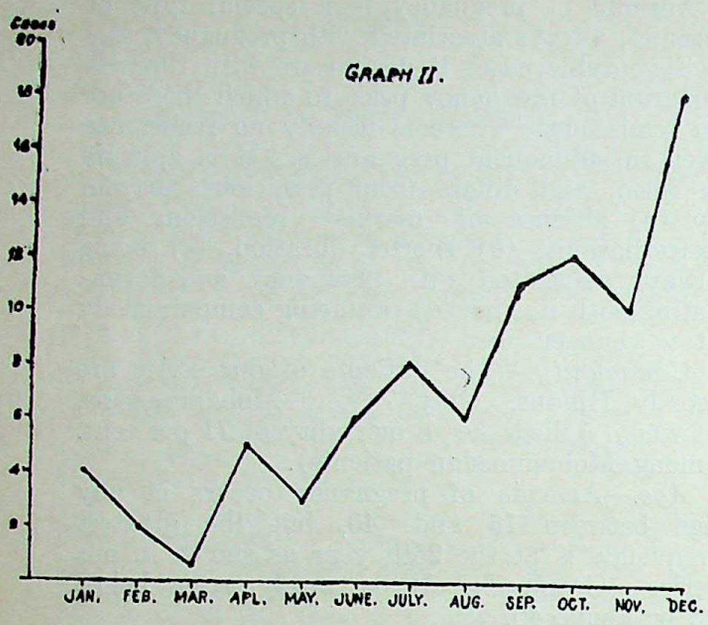
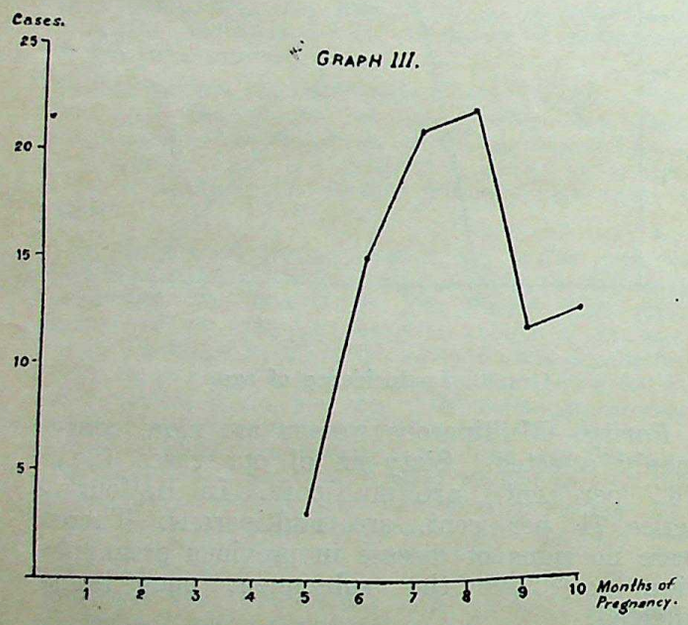


Graph II.—Seasonal variation.

It is most common between the 6th and 8th months of pregnancy as shown in Graph III. In our series no case was found before the fifth month.



Graph III.—Incidence of prematurity.

Onset.—The disease comes on insidiously, there being practically no history of previous illness. It is very difficult to get a correct and accurate history of onset. The earliest subjective symptoms are breathlessness on slight exertion, gastro-intestinal disturbances, puffiness of the face, blanched appearance and occasional fever. The patients seek for treatment generally within a month from the appearance of symptoms, and in about 80 per cent. of cases, their general condition is low on admission.

Diarrhœa.—This was present in 38 cases (i.e., 44 per cent.); and there was soreness of the mouth in 71 cases. Microscopical examination of the stools invariably gave negative results. Only in one case were cysts of *Entamœba histolytica* found. No culture for *B. welchii* was made.

Fever.—In 31 cases (i.e., 36.7 per cent.) fever was present. The spleen was enlarged in 21.9 per cent., the liver in 4.8 per cent., and both liver and spleen were enlarged in 19.4 per cent. of cases.

Œdema.—Sixty-seven cases (i.e., 77.9 per cent.) had puffiness of the face and generalised œdema. The parts most affected are the extremities, particularly the lower ones.

Urine.—This was scanty to start with, but if the patient progressed favourably, the quantity increased steadily. Albumen was present in 26 per cent. of cases, and in about 50 per cent. of cases culture gave positive results; the organisms commonly found were streptococci, but a few *B. coli* were present.

Cardio-vascular system.—Breathlessness and palpitation were present in almost all cases. The vessels of the neck were full and pulsating. The heart was dilated, and a hæmic murmur was present. The pulse was of the water-hammer type.

The blood pressure is usually low. In 52 per cent. of our cases, the systolic pressure was 100 mm. of mercury or below; in 36 per cent. it was between 100 and 125 mm. of mercury, and in only 12 per cent. of cases was it above 125 mm. of mercury.

The pulse pressure varies between 40 and 45 mm.

Blood examination.

1. The hæmoglobin value was estimated to be 28.4 per cent. from the average of 75 cases. The minimum hæmoglobin value was found to be 10 per cent., in 3 cases, it was between 11 and 15 per cent. in 8 cases, between 16 and 20 per cent. in 12 cases, between 21 and 25 per cent. in 20 cases, between 26 and 30 per cent. in 4 cases, between 31 and 35 per cent. in 10 cases, between 36 and 40 per cent. in 9 cases, between 41 and 45 per cent. in 8 cases and above 45 per cent. in 2 cases (Graph IV).

2. The average colour-index was 1.35 in 30 cases.

3. The red blood corpuscle count was below one million in 40 per cent. of cases, between one and two millions in 53.7 per cent. of cases, and above 2 millions in only 6.3 per cent. of cases. The minimum red blood corpuscle count was 435,000.

4. There was no leucopænia in our series; on the other hand there was a tendency to leucocytosis. Myelocytes were very frequently present.

5. Anisocytes were almost always present; normoblasts were commonly found; and megaloblasts poikilocytes very frequently present; very rarely met with. In Balfour's series,

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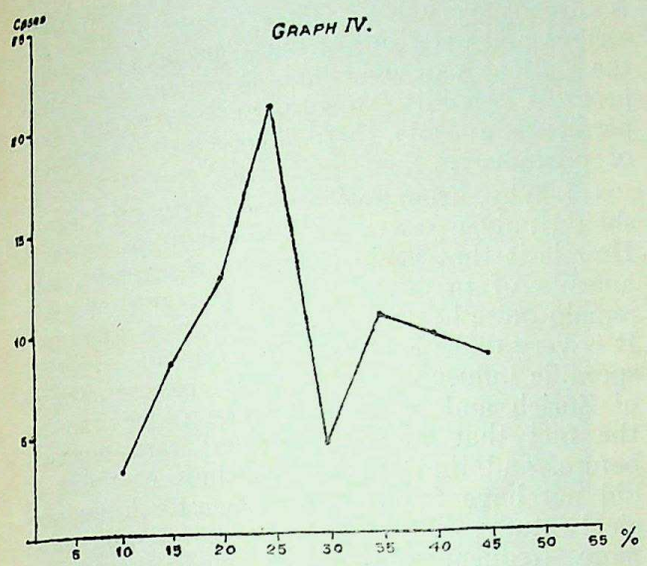
normoblasts were present in 50 per cent. of cases. L. Mudalier found it more frequent especially during the blood crises which occur



Graph IV.—Hæmoglobulin values.

when the condition of the patient is low, i.e., when diarrhœa sets in, in fever or just after confinement.

6. *Malarial parasites.*—These were not found in cases associated with fever, where the blood was specially examined for malarial parasites.

7. *Wassermann reaction.*—Four out of 11 had a positive reaction. Of these 4 cases, 2 had 2/10 positive, and only one had 8/10 positive.

Clinical course and termination.

Although insidious in onset the disease progresses fairly rapidly. Patients are admitted in the hospital in a low condition but improve to a certain extent by rest and general medicinal treatment. About 4 to 6 weeks elapse after the onset of the disease before they come under observation, and the course terminates within an average of 11.4 days, either by cure or by death. The shortest stay in hospital after admission was less than 24 hours in 11 cases (from a record of 66 cases), less than 3 days in 17 cases and less than a week in 28 cases. The longest stay was 43 days, in one case.

In 9 out of 10 cases labour is premature, occurring invariably spontaneously. Post-partum hæmorrhage is a rare phenomenon in the anæmia of pregnancy. We had severe post-partum hæmorrhage in only one case (Case 17). Puerperal morbidity, according to the British Medical Association standard, occurred in 39 per cent. cases (from a record of 66 cases).

Fourteen patients left the hospital undelivered, of whom 8 were definitely improved though not cured, and 6 were otherwise; of the 8 improved cases information has been obtained that 2 were cured after confinement (Cases 41 and 59).

Mortality.

Mother.—Twenty-five mothers died in the hospital, a maternal mortality of 29 per cent.; but if the cases left undelivered be reckoned as dead, except the two patients who have been followed up and found cured, the maternal mortality would be 43 per cent. Of 25 fatal cases, 3 patients died undelivered, 10 within 24 hours after confinement, 6 between the 2nd and the 7th day and 6 between the 2nd and the 4th week.

Regarding prognosis, we have noticed that cases with œdema react well after confinement. In our series 67 cases had œdema, among whom there was a mortality of 26.8 per cent. The prognosis is worse in cases having diarrhœa. There was a mortality of 45.9 per cent. amongst our diarrhœic cases.

Child.—The infant mortality was 52.8 per cent.; 36.1 per cent. infants were still-born and the other 16.7 per cent. died within a week. There was twin pregnancy in two instances; of these one pair died.

The convalescent period of non-fatal cases is mostly of short duration, although occasionally cases are met with where the patients continue suffering for some weeks, and even for some months. We try to follow up cases, but it is very difficult to trace them, there being no fixed residence in many cases and no system of notification of change of residence to the municipal office or to the Police Station. Out of 61 cases, we have been able to follow up eight cases.

One patient (Case 81) became pregnant and gave birth to a healthy full-term baby; she had no recurrence of anæmia.

Pathological anatomy.

Liver.—Remarkable changes are noticed in the liver. It is large in size, very pale in colour, and friable. There is no extravasation of blood under the capsule.

Histological examination shows fatty degeneration of the central part of the lobule accompanied by extravasation of blood, while the peripheral part looks quite healthy (Fig. 1, Case 63). The deposition of hæmosiderin in the peripheral liver cells and in the Kupffer's cells (reticulo-endothelial system), and its absence from the central zone has been shown by the ferro-cyanide test (Fig. 2, Case 63). This characteristic fatty degeneration of cells only round the central lobular veins and the hæmorrhage beyond it, a fact hitherto unnoted, points definitely to the toxæmic origin of the anæmia of pregnancy. The toxin might be of the same nature as that of hyperemesis gravidarum or of acute yellow atrophy, where also similar degeneration of the central portions of the lobules is found.

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Case 72 shows the same degenerative process in the central zone. Definite hæmatopoietic changes are also noticed in the area intervening between the central degenerated zone and the peripheral healthy area (Fig. 3).

Similar changes in the process of central degeneration are noticed in the third and fourth cases (Cases 85 and 86), though the changes are less marked in Case 86.

Side by side with this central degeneration there is undue activity of the cells of the reticulo-endothelial system in the peripheral area as evidenced by erythrophagocytosis (Fig. 2). This has another important bearing, which we shall discuss in the treatment of the anæmia of pregnancy.

Spleen.—This was enlarged in 41.3 per cent. of cases. Proliferation of cells of the reticulo-endothelial system is marked. There is no degenerative process on histological examination from Case 63.

Kidney.—Very slight degeneration has been observed, and the proliferation of cells of the reticulo-endothelial system is not very marked.

Bone marrow.—We have examined the tibia in all the 4 cases which formed the basis of our pathological study. Aplastic changes are present. Red marrow is present only in the epiphysial boundary; otherwise the whole field is full of yellow marrow (Case 63).

Case 72 shows hæmatopoietic changes including the presence of megaloblasts. This might be due to the fact that tissues were taken from the epiphysial zone. Here also there is yellow marrow all over the field.

Case 85 shows similar changes, but hyperplastic red marrow is present in Case 86.

Ætiological investigation.

The moot point is, (*i*) whether it is a primary disease due to pregnancy, or (*ii*) a secondary one associated with pregnancy and aggravated by it.

Points in favour of (*i*) are, (*a*) the symptoms always begin with pregnancy, (*b*) recovery never takes place before confinement, (*c*) once the disease is cured after confinement, there is no relapse.

Points against it are, (*a*) experienced obstetricians like Ahfeld (Marburg University) have not seen a single case of anæmia of pregnancy. This can be explained by the fact that obstetricians of those days were not so conversant with hæmatological examinations. Later on, many cases have been observed from the same Marburg Clinic (Esch, 1917).

(*b*) Labendzinski (1912) says that no improvement towards recovery is noticed by termination of pregnancy, spontaneous or artificial. In most cases, the patient's condition becomes worse after confinement and ultimately she dies in spite of easy parturition even in the absence of post-partum hæmorrhage. It may be that the damage already done to the system by the toxin of the disease cannot be made good immediately after confinement. In a normal labour, which is a physiological process, there is lowered resistance of the body; in anæmia of pregnancy the mother's condition is already very low, and it naturally becomes serious and even fatal after confinement. Once the patient can overcome the shock, she will progress rapidly towards recovery. Unlike pernicious anæmia, there is no relapse in anæmia of pregnancy.

(*c*) Why, from millions of pregnancy cases, should only a few have anæmia of pregnancy? How is it that patients suffering severely from anæmia of pregnancy on a previous occasion remain quite healthy in subsequent pregnancies? It is very difficult to explain. Lazarus says that sporadic influence plays a great rôle, e.g., cases of Zurich and of Parma. The fallacy lies in the fact that fatal cases were not reported before, and that the obstetricians of the past did not have facilities for accurate hæmatological study. Nowadays, cases are observed more frequently in places where none was noticed before (e.g., in the Marburg Maternity Clinic).

(*ii*) Is the anæmia secondary to (*a*) malaria or kala-azar, (*b*) dysentery, (*c*) hookworms, *Bothriocephalus latus*, etc., (*d*) sprue, or (*e*) syphilis ?

(*a*) *Malaria.*—Thirty-one cases of our series (i.e., 36 per cent.) gave a history of fever; these cases had a mortality rate 38.7 per cent. In only one case were benign tertian parasites found, but the spleen was enlarged in 21.9 per cent. of cases, the liver in 4.8 per cent., and both liver and spleen in 19.4 per cent. of cases. Although malarial parasites were not very scrutinisingly searched for, clinical pictures of malarial fever were not characteristic. Balfour found malarial parasites in 13 cases (the total number of cases being 150) with a mortality rate of 33 per cent. "Parasites are not the cause of anæmia in these 13 cases as many people in Bombay are similarly infected" (Balfour, 1927).

Kala-azar.—We had one case (Case 19), where the urea-stibamine test was positive.

(*b*) *Dysentery.*—Although gastro-intestinal disturbance is one of the chief complaints in anæmia of pregnancy, the cysts of *Entamœba histolytica* are very rarely found. In our series they were found in 1 out of 20 cases specially examined for them. No other ova were found. Diarrhœa was present in 37 cases (i.e., in 43 per cent. of cases), with a mortality rate of 45 per cent. The stools are not characteristic of dysentery.

(*c*) *Sprue.*—Some of the cases resemble sprue having a symptom-complex of anæmia, persistent diarrhœa, and sore mouth. They differ from it by absence of emaciation, by having no characteristic stools, and by the fact that

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Plate I.

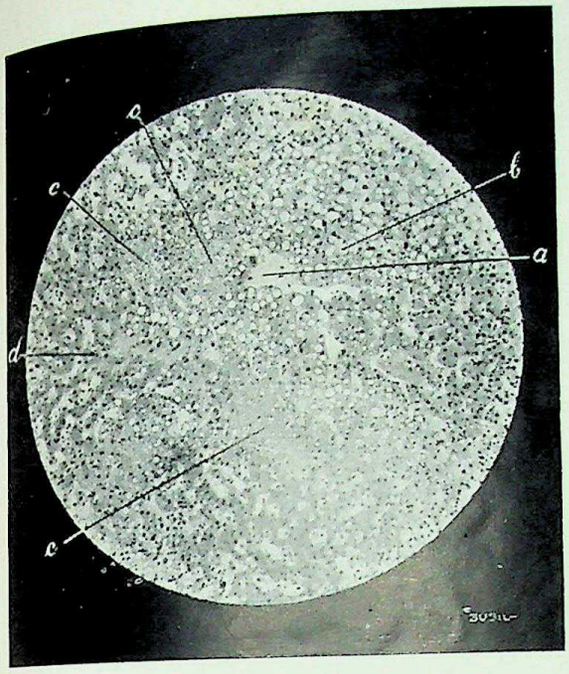

Fig. 1. Case No. 63.—Photomicrograph of a section of liver showing (*a*) central lobular vein; (*b*) fatty degeneration in liver cells round the central lobular vein; (*c*) hæmorrhagic area; (*d*) healthy liver cells in the periphery.

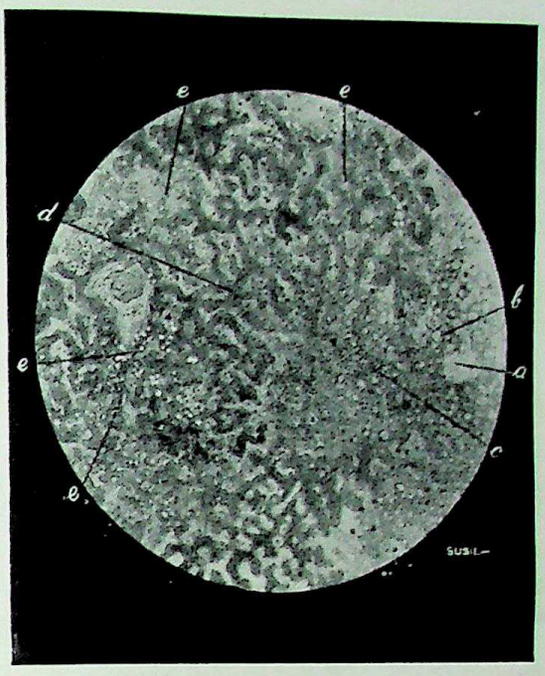

Fig. 2. Case No. 63.—Same changes noticed as in Fig. 1. (*a*), (*b*), (*c*) and (*d*) correspond to those in Fig. 1. (*e*) deposition of hæmosiderin in the peripheral liver cells and in the Kupffer's cells.

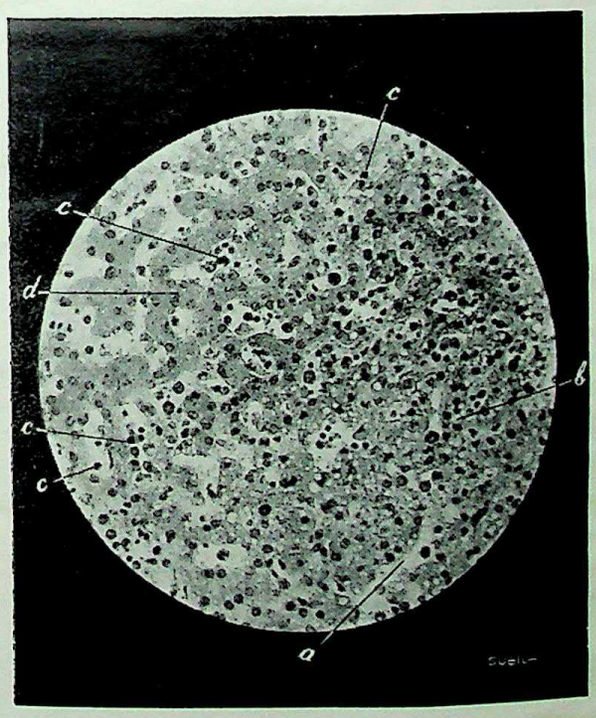

Fig. 3. Case No. 72.—Photomicrograph of a section of liver showing (*a*) central lobular vein; (*b*) fatty degeneration in liver cells; (*c*) karyokinetic changes inside liver cells; (*d*) healthy liver cells in the periphery.

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recovery after delivery is as complete as in non-diarrhœic cases.

(*d*) *Hookworms*, Bothriocephalus latus, *etc.*—Severe types of anæmia have been noticed following infection by various kinds of intestinal worms, but anæmia of pregnancy is not generally associated with them. Balfour found ova in one case only. In our series, we found ova of ankylostoma in one case.

(*e*) *Syphilis.*—Concealed syphilis has been supposed to be the cause of anæmia of pregnancy in some cases. In our series, only 4 out of 11 patients had a positive Wassermann reaction. Of these 4 cases, 2 had a 2/10 positive, and only one a 8/10 positive. In Balfour's series, 15 out of 32 had a positive Kahn test. McSwiney (1927) showed a positive Wassermann reaction in 40 per cent. of his cases.

Infective theory.

This theory presupposes an infection from the bowel, bladder or genital passages.

From the bowel.—The alimentary canal is the bed of various kinds of organisms, some of which have been incriminated in the causation of anæmia of pregnancy. Lüdke and Fejes found a hæmolytic agent from the intestinal bacteria. Nerurkar has isolated *Streptococcus longus* from the duodenum. Emanuelov and Mehta (1927) have isolated some strains of *B. welchii*, hæmolytic and non-hæmolytic, from the fæces of anæmia of pregnancy cases. Cultures of *B. welchii* were found by them to be non-pathogenic for animals when injected subcutaneously or intraperitoneally; but such cultures were pathogenic to the unborn young. In all cases where pregnant guinea-pigs were inoculated the young ones were still-born, or died within 3 days. This peculiar phenomenon of affecting chiefly the unborn young ones and not the mother does not correspond clearly with typical cases of anæmia of pregnancy where the young, although invariably prematurely born, do not suffer from the same blood destruction as the mother.

The frequency of gastro-intestinal disturbances suggests that some of the saprophytic organisms of the alimentary canal may become pathogenic, thus altering the condition of the bowel wall and allowing the organism or its toxins to pass through into the general circulation.

From the bladder.—Various organisms have been isolated by urine culture. Streptococci are the commonest, but these streptococci are seldom found to be hæmolytic.

From the genital passages.—Puerperal sepsis sometimes produces grave forms of anæmia, but most of the cases are already anæmic during pregnancy. It is worth while to take a culture from the cervix and vagina during pregnancy in these anæmia cases.

Toxæmic theory.—The toxæmic theory of anæmia of pregnancy is gaining ground slowly and steadily. James Young suggests that the primary cause of anæmia of pregnancy is a toxin from the placenta.

Morawitz (1907) and Turk pointed out that the pathogenesis of anæmia depends upon a hæmolytic toxic agent. Physiologically there is destruction of blood corpuscles in the placenta, and the products of breaking down (especially iron) are utilised for the growth of the fœtus.

Strahl, Bonnet and Kolster have shown by animal experimentation that the ectodermal cells of the chorion can take up hæmoglobin, hæmatoidin crystals and even blood cells. Wychel (1902) has shown that the urine of pregnant women contains more albumin than that of non-pregnant women—on account of partial hæmolysis.

Neumann and Herrmann (1911) have found a cholesterin ester in the blood of an advanced pregnant woman. This lipoidæmia is more common in multiparæ than in primiparæ. Heymann has further shown that a lipoid substance can be obtained from an alcoholic extract of the autolysed placenta, and that it can produce hæmolysis *in vitro*. This hæmolysin normally breaks down maternal blood cells and is found both in the placenta and in the blood. A similar substance is found in the anæmia caused by *Bothriocephalus latus*. Port (1912) has experimentally produced anæmia in rabbits by intravenous injection of lecithin solution. There is degeneration of erythrocytes with proliferative activity of the hæmatopoietic system.

Thus it appears that anæmia of pregnancy is a toxæmic condition, the toxin having its origin most probably at the site of the placenta. The toxæmia of pregnancy has various manifestations affecting different organs of the body in different conditions, eclampsia, hyperemesis gravidarum, acute yellow atrophy, antepartum hæmorrhage, etc. In anæmia of pregnancy, the toxin has a special predilection for the hæmatopoietic system. The toxin lowers the resistance of the body, and the presence of aplastic anæmia is the indirect result of a toxin from the placenta. The toxæmias do not necessarily occur in the next pregnancy, thus providing evidence that aplastic anæmia is due to a toxin from a placental area of degeneration.

That anæmia of pregnancy is a toxæmia of pregnancy is further evidenced by the histological examination of the liver, where very characteristic changes, similar to those found in hyperemesis gravidarum or in acute yellow atrophy, are noticed (Figs. 1 and 2).

Treatment.

Until now, no specific treatment for anæmia of pregnancy has been found. Treatment is mainly symptomatic, and palliative only until pregnancy is over. Cases are never considered cured until they are confined and until a

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TABLE OF CASES.

(A study of 86 cases in the Seva-Sadan from 1926 to 1929-30.)

Serial No.	Name or Regd. No.	Date of Admission.	Age.	Parity.	Month of Pregnancy.	Swelling.	Diarrhœa.	Fever.	Liver and Spleen.	Date of Confinement.	Result. Mother.	Result. Child.	Date of Discharge or Death.	Blood Examination.	Other Examinations.	Special Treatment.	Result of following up.	Remarks.
1	612	29-9-27	30	10th	F. T.	+	—	+	..	29-9-27	L.	L.	12-10-27	Hb.-18% R.B.C. 940,000 Benign tertian.	..	..	..	Morbidity.
2	741	18-11-27	22	3rd	6th	—	—	—	..	..	Died undelivered.		21-11-27	Hb.-15% R.B.C. 560,000 Normoblasts, Poikilocytes, etc.	..	..	..	..
3	622	29-9-27	18	1st	7th	+	—	—	..	29-9-27	L.	L.	20-10-27	Hb.-25% R.B.C. 625,000	*Ent. histolytica.* Urine-Alb. *nil.*	..	..	Puerperal morbidity.
4	584	15-9-27	21	1st	F. T.	+	—	—	..	19-10-27	L.	L.	4-11-27	Hb.-15% R.B.C. 695,000	Urine-Alb. *nil.*	..	..	..
5	738	15-11-27	15	1st	6th	—	—	—	..	15-11-27	D.	S. B.	16-11-27	Hb.-12% R.B.C. 435,000 Normoblasts.	Urine-Alb. present.	..	..	..
6	609	24-9-27	26	7th	F. T.	+	—	—	..	26-9-27	L.	L.	5-10-27	Hb.-31% R.B.C. 1,800,000 Normoblasts.	Urine-Alb. present.	..	..	..
7	489	10-8-27	18	1st	6th	+	+	—	..	..	D.	D.	19-8-27	Hb.-24%-20% R.B.C. 855,000	Urine-Alb. present. Casts.	..	..	..
8	829	16-12-27	18	1st	8th	+	+	+	..	22-12-27	D.	S. B.	22-12-27	Hb.-24% R.B.C. 845,000 Normoblasts.	Urine-Alb. present.	..	..	..
9	677	25-10-27	20	2nd	7th	?	—	—	..	..	L.	L.	..	Hb.-25% R.B.C. 660,000	Alb. *nil.*	..	..	..

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10	859	28-12-27	25	5th	F. T.	+	—	—	..	28-12-27	L.	L.	..	Hb.-35% R.B.C. 1,200,000	Alb. *nil.*	..	..	..
11	749	20-11-27	35	8th	F. T.	—	—	—	..	25-11-27	L.	L.	3-12-27	Hb.-55% R.B.C. 1,900,000	Alb. *nil.*	..	..	Puerperal morbidity.
12	231	19-4-27	25	2nd	F. T.	+	—	—	..	20-4-27	L.	L.	28-4-27	Hb.-40% R.B.C. 1,450,000	..	..	..	Puerperal morbidity.
13	656	14-10-27	21	5th	6th	+	—	—	..	..	Relieved undelivered.		13-11-27	Hb.-18% R.B.C. 770,000	Alb. *nil.*	9 whole-blood inj. of 15 c.c.	..	..
14	?	13-11-27	17	1st	F. T.	+	—	—	..	..	L.	L.	..	Hb.-35% R.B.C. 1,760,000	..	..	..	..
15	193	..	30	11th	6th	+	—	—	..	..	D.	D.	..	Hb.-20% R.B.C. 870,000 Normoblasts.	..	..	..	..
16	488	19-6-28	25	1st	F. T.	+	—	—	..	20-6-28	L.	L.	19-7-28	Hb.-45% R.B.C. 1,950,000 Normoblasts.	Urine-Alb. *nil.*	..	..	Morbidity Double mitral.
17	581	18-7-28	24	3rd	8th	+	..	..	Spl. ++	27-7-28	D.	S. B.	27-7-28	Hb.-35% R.B.C. 1,400,000	Urine-Alb. *nil.*	..	..	P. P. H.
18	909	13-10-28	19	2nd	7th	+	—	—	..	27-10-28	L.	S. B.	4-11-28	Hb.-35% R.B.C. 570,000 Normoblasts.	Urine-Alb. *nil.*	..	..	Thread-worms.
19	866	5-10-28	18	2nd	7th	—	—	+	Spl. +	..	L.	S. B.	..	Hb.-45% R.B.C. 2,060,000 Normoblasts W.B.C. 2,500	..	..	..	Urea stibamine test positive.
20	986	1-11-28	30	3rd	7th	+	..	..	..	..	Left undelivered.		..	Hb.-45% R.B.C. 1,300,000 Normoblasts.	Urine-Alb. *nil.*	..	..	..
21	1117	20-11-28	30	4th	7th	..	..	..	..	..	Left undelivered.		..	..	..	..	..	Patient's condition bad, left before proper examination done.
22	1145	4-12-28	16	1st	8th	+	+	+	..	..	Left undelivered.		..	Hb.-35% R.B.C. 680,000 Normoblasts.	..	..	..	..
23	1135	3-12-28	22	3rd	F. T.	+	+	+	..	5-12-28	L.	D.	22-12-28	Hb.-25% R.B.C. 860,000 Normoblasts.	..	..	..	..

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TABLE OF CASES—*contd.*

Serial No.	Name or Regd. No.	Date of Admission.	Age.	Parity.	Month of Pregnancy.	Swelling.	Diarrhœa.	Fever.	Liver and Spleen.	Date of Confinement.	Result. Mother.	Result. Child.	Date of Discharge or Death.	Blood Examination.	Other Examinations.	Special Treatment.	Result of following up.	Remarks.
24	2409	19-12-28	22	2nd	7th	+	+	—	..	19-12-28	D.	S. B.	21-12-28	..	..	..	..	..
25	1220	22-12-28	28	7th	7th	+	+	..	..	..	Left undelivered.		..	..	Urine-Alb. *nil.*	..	..	..
26	315	11-10-28	39	7th	6th	..	..	..	..	..	Left undelivered.		..	..	..	..	..	..
27	346	25-10-28	30	7th	8th	..	..	..	..	..	Left undelivered.		..	..	..	..	..	..
28	M.	6-12-28	30	5th	8th	+	..	..	..	..	Left undelivered. Relieved.		9-2-29	Hb.-25%	..	..	No information.	..
29	C.	21-12-28	40	9th	6th	++	—	—	..	27-2-29	L.	D.	9-3-29	Hb.-30%-50% R.B.C. 810,000 -1,450,000	Urine-Alb. *nil.*	..	No information.	..
30	C.	4-4-29	25	4th	8th	+	+	+	Spl.+	23-4-29	L.	D.	2-5-29	Hb.-35%-45% Normoblasts, Poikilocytes.	B. P. $\frac{120}{75}$	..	No information.	..
31	P.	6-4-29	25	4th	8th	+	+	—	Spl.+	14-4-29	L.	L.	30-4-29	Hb.-25%-45% R.B.C. 1,250,000 -2,520,000 Myelocytes.	No ova in stools. B.P. $\frac{90}{45}$ Alb. *nil.*	..	No information.	Morbidity.
32	L.	8-4-29	14	1st	8th	+	—	+	—	11-4-29	D.	S. B.	11-4-29	Hb.-36% R.B.C. 1,970,000	B. P. $\frac{100}{65}$ Urine-no alb. No ova in stools.	..	..	Œdema increasing after confinement.
33	S.	22-5-29	22	6th	7th	+	—	—	—	23-5-29	D.	S. B.	24-5-29	Hb.-10% R.B.C. 500,000 Myelocytes.	Sore mouth. Urine-no alb. Stools -no ova.	..	..	..

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34	R.	30-5-29	22	1st	8th	+	+	—	..	31-5-29	L.	S. B.	15-6-29	Hb.-25%-10%-30% R.B.C. 1,270,000-800,000-1,480,000 Normoblasts, etc.	Urine-no alb. Stools -no ova.	..	No information.	..
35	I.	4-6-29	25	4th	7th	+	+	—	—	..	Died undelivered.		16-6-29	Hb.-15% R.B.C. 720,000 Normoblasts, Anisocytes, Poikilocytes.	Urine-cult.-*nil*. Stools -no ova. No alb. in urine.	..	..	..
36	G.	13-6-29	23	2nd	7th	—	+	+	Spl.+	18-6-29	D.	S. B.	18-6-29	Hb.-15% R.B.C. 580,000 Anisocytes, Poikilocytes, Myelocytes.	Urine-*B. coli*.	..	..	Membranes ruptured artificially.
37	R.	31-8-29	29	9th	6th	+	+	+	Liv.+ Spl.+	..	D.	S. B.	8-9-29	Hb.-25%-13% R.B.C. 800,000-640,000	B. P. $\frac{100}{55}$ Sore mouth.	*X*-ray.	..	..
38	L.	24-8-29	28	4th	F. T.	+	+	—	..	24-8-29	L.	L.	4-9-29	Hb.-45% R.B.C. 1,490,000	..	..	No information.	Morbidity.
39	S.	15-8-29	25	5th	7th	+	+	+	—	23-8-29	L.	L.	8-9-29	Hb.-65%-21% R.B.C. 1,430,000	Urine-no alb.	..	No information.	Thread-worms.
40	S.	9-8-29	18	1st	7th	+	+	+	+	10-8-29	D.	S. B.	11-8-29	Hb.-20% R.B.C. 1,120,000	Sore mouth	..	..	Temp. 104.
41	B.	31-7-29	21	6th	9th	+	—	—	..	..	Relieved. Left undelivered.		24-8-29	Hb.-45% R.B.C. 2,220,000 Normoblasts, Anisocytes, Poikilocytes.	..	..	21-5-30 Very well Hb.-65% R.B.C. 2,750,000 No abnormal cells.	..
42	S.	15-7-29	20	3rd	7th	+	—	+	+	21-7-29	L.	D.	12-8-29	Hb.-15%-19%	Mouth-sore. Stools-no ova. B. P. $\frac{115}{70}$	*X*-ray.	No information.	Morbidity.
43	A.	12-7-29	21	2nd	7th	+	+	+	+	18-7-29	L.	L.	5-8-29	Hb.-20%-55% R.B.C. 1,900,000-2,640,000.	Mouth-sore.	*X*-ray.	8-1-30 Hb.-60% R.B.C. 2,500,000	Morbidity.
44	S.	7-7-29	22	2nd	9th	+	+	+	—	15-7-29	L.	L.	2-8-29	Hb.-40% R.B.C. 2,040,000	Stool-ova of thread-worm. Urine -no alb. B. P. $\frac{95}{55}$	..	..	..

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45	R.	5-7-29	20	2nd	F. T.	+	+	+	..	9-7-29	L.	L. Twins	20-8-29	Hb.-35% R.B.C. 1,680,000	Stools-Thread-worm.	Shoulder presentation. Int. podalic version.	No information.	Morbidity.
46	G.	2-7-29	22	4th	6th	+	—	+	+	..	Relieved. Left undelivered.		11-8-29	Hb.-25%-43% R.B.C. 1,500,000 -1,550,000	Stools-no ova. Gums -spongy.	..	No information.	..
47	E.	17-6-29	19	1st	6th	+	+	+	Not palpable.	25-6-29	D.	S. B.	Within a week.	Hb.-10% R.B.C. 480,000 Normoblasts, Myelocytes.	B. P. $\frac{20}{30}$ Pyorrhœa. Urine cult.-*nil*. Stool-no ova.	..	..	..
48	D.	14-6-29	22	1st	5th	+	+	+	+	22-7-29	L.	L.	3-8-29	Hb.-25%-35% R.B.C. 1,600,000 -1,990,000 Abnormal cells.	Urine cult. Staphylococci. B. P. $\frac{75}{30}$	Ultra-violet-rays.	No information.	Morbidity.
49	A.	9-6-29	22	4th	9th	+	—	—	—	10-6-29	L.	S. B.	25-6-29	Hb.-15%-20% R.B.C. 1,560,000 Poikilocytes, Anisocytes.	B. P. $\frac{80}{30}$ Urine cult.-*nil*. Pyorrhœa.	..	No information.	Morbidity.
50	B.	9-5-29	20	3rd	9th	+	—	—	*Nil*	10-5-29	L.	L.	18-5-29	Hb.-35% R.B.C. 1,930,000	..	..	..	..
51	S.	3-4-29	18	2nd	8th	—	—	—	..	3-4-29	L.	L.	15-4-29	Hb.-45% R.B.C. 1,530,000 Normoblasts, Anisocytes.	Urine-Alb. +	..	No information.	..
52	L.	11-1-29	30	1st	8th	+	+	—	..	12-1-29	L.	D.	25-1-29	Hb.-30% R.B.C. 1,470,000 Normoblasts, Anisocytes.	..	..	..	Morbidity.

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53	N.	15-12-28	29	5th	9th	—	+	—	..	30-12-28	L.	D.	14-1-29	Hb.-40% R.B.C. 1,480,000	..	..	Presented herself for examination, doing very well.	Morbidity.
54	N.	10-12-28	19	1st	8th	+	—	—	..	31-12-28	D.	D.	5-1-29	Hb.-54% R.B.C. 1,280,000 W.B.C. 16,248	W. R. 4/10 positive B. P. 125 Urine-Alb.	..	..	..
55	S.	26-11-28	25	6th	7th	+	—	—	+	..	Left undelivered. Relieved.		4-1-29	Hb.-45%-55% R.B.C. 1,635,000 Normoblasts.	Stools-no ova or cysts.	..	No information.	..
56	A.	7-10-29	34	7th	7th	+	+	—	—	7-10-29	L.	S. B.	27-10-29	Hb.-41% R.B.C. 2,516,000 Poikilocytes.	..	X-rays.	No information.	..
57	R.	3-9-29	20	2nd	F. T.	+	—	—	..	3-9-29	L.	S. B.	17-9-29	Hb.-14%-40% R.B.C. 680,000-1,840,000	B. P. $\frac{105}{55}$ Urine-Alb. present.	X-rays.	No information.	..
58	R.	28-8-29	20	1st	9th	+	+	—	—	..	Went away		..	Hb.-31% R.B.C. 2,510,000	Pyorrhœa.	..	No information.	..
59	B.	1-9-29	17	2nd	6th	+	+	—	—	..	Went away		..	Hb.-25% R.B.C. 1,190,000	B. P. $\frac{80}{50}$ Pyorrhœa. Stools-no ova.	X-rays.	..	Patient got well. Information through attending doctor.
60	S.	31-7-29	23	6th	7th	+	+	+	—	16-8-29	L.	D.	28-9-29	Hb.-10% R.B.C. 1,360,000	B. P. $\frac{105}{60}$ Pyorrhœa.	X-rays.	No information.	Morbidity.
61	B.	3-9-29	20	1st	7th	+	+	+	—	..	Went away		..	Hb.-18% R.B.C. 790,000	Pyorrhœa B. P. $\frac{130}{80}$ Urine-no alb. Stools-no ova.	X-rays.	Informed by attending doctor, dead.	..
62	K.	23-10-29	25	3rd	8th	+	—	+	Spl.+	2-11-29	D.	S. B.	3-11-29	Hb.-20% R.B.C. 840,000	Sore mouth. Stools-no ova. Urine-no alb.	Induction of labour, castor-oil, quinine and pituitrin.	..	..
63	B.	30-10-29	22	2nd	9th	+	—	—	Spl.+	1-11-29	D.	D.	5-11-29	Hb.-25% R.B.C. 920,000	Sore mouth	..	..	Morbidity, puerperal diarrhœa. Temp. 104.
64	M.	24-9-29	42	6th	9th	—	+	—	—	29-9-29	D.	D.	8-10-29	Hb.-35%-20% R.B.C. 1,300,000 -1,070,000	Sore mouth. B. P. $\frac{85}{45}$ Urine-Alb. +	..	..	Dysentery.

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TABLE OF CASES—*contd.*

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65	M.	4-12-29	20	2nd	9th	+	—	+	+	5-12-29	D.	S. B.	15-12-29	Hb.-40% R.B.C. 1,300,000 W.B.C. 4,500	Sore mouth. Stool-no ova.	..	..	Morbidity.
66	K.	14-11-29	19	2nd	5th	—	—	—	—	..	Relieved. Left undelivered.		23-11-29	Hb.-40% R.B.C. 2,090,000 W.B.C. 7,800	Sore mouth. W. R. negative.	..	No information.	..
67	S.	17-11-29	30	10th	7th	+	+	+	—	27-11-29	D.	S. B. Twins	27-11-29	Hb.-25% R.B.C. 1,100,000 W.B.C. 5,304	Mouth sore. W.R. 4/10 positive.	Manual removal of placenta.	..	..
68	P.	27-10-29	21	1st	8th	+	+	+	+	1-11-29	L.	S. B.	25-11-29	Hb.-28%-55% R.B.C. 1,060,000 -1,450,000 W.B.C. 5,616	Mouth sore. Urine-no alb. Stools-no ova or cysts.	..	No information.	Morbidity.
69	K.	16-10-29	25	7th	7th	—	—	+	—	12-11-29	D.	D.	2-12-29	Hb.-25%-15% R.B.C. 1,300,000 -730,000. W.R. 4/10 positive. Myelocytes, Poikilocytes.	Urine cult.-*B. coli*. Stools-no ova.	*X*-rays.	..	105°F. with rigor. No M. P. Morbidity.
70	N. D.	24-9-29	35	8th	9th	—	+	—	—	12-10-29	L.	L.	24-10-29	Hb.-45% R.B.C. 2,500,000 W.B.C. 4,992	Urine-no alb. Stools-no ova or cysts.	..	No information.	Morbidity.
71	P.	11-10-29	40	12th	F. T.	+	—	—	—	11-10-29	L.	L.	22-10-29	Hb.-40% R.B.C. 1,050,000 W.B.C. 3,120	..	..	..	..

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72	S.	16-12-29	25	3rd	7th	+	—	—	—	..	Died un-delivered.		24-12-29	Hb.-20% R.B.C. 700,000 Anisocytes, Poikilocytes.	..	..	..	Urine-no alb.
73	K.	30-11-29	30	4th	8th	+	+	+	—	Confined outside. 12-11-29	L.	L.	9-1-30	Hb.-25%-50% R.B.C. 1,200,000 -2,480,000	Mouth sore. B. P. $\frac{105}{55}$ W.R. negative. Urine-Alb. +	X-ray.	Baby died after six weeks.	..
74	D.	10-12-29	24	5th	8th	+	—	—	—	17-12-29	L.	S. B.	6-1-30	Hb.-25%-45% -60%. R.B.C.-960,000-1,780,000-2,480,000	W.R. 7/10. Urine-no alb. Stools-no ova.	X-ray.	18-5-30 Very well.	Morbidity.
75	A.	2-12-29 24-12-29 (readmitted).	24	4th	9th	+	—	—	Liv.+	25-12-29	L.	L.	1-1-30	Hb.-40%-55%	No soreness of mouth.	..	Doing well.	..
76	S.	11-12-29	30	3rd	8th	+	—	+	Spl.+	..	Left un-delivered.		26-12-29	Hb.-45% R.B.C. 1,140,000	Mouth sore. W.R. 8/10	..	No information.	..
77	R.	21-11-29	32	7th	8th	+	+	+	—	25-11-29	D.	S. B.	8-12-29	Hb.-25% R.B.C. 920,000	Mouth sore. W.R. negative.	X-ray.	..	Morbidity.
78	G.	8-1-30	25	2nd	8th	+	+	—	+	20-1-30	L.	S. B.	28-1-30	Hb.-45%-65% R.B.C. 750,000 -2,340,000 Anisocytes, Myelocytes.	Mouth sore. B. P. $\frac{115}{75}$	X-ray.	..	..
79	B.	26-12-29	26	1st	8th	+	+	—	—	9-1-30	L.	D.	17-2-30	Hb.-40% R.B.C. 1,570,000	Mouth soreness-*nil*. B. P. 85 Urine-no alb.	..	No information.	Morbidity. Baby died after 8 days.
80	N.	4-12-29	30	4th	8th	+	—	+	Spl.+	..	L.	L.	..	Hb.-30%-45% R.B.C. 1,610,000 -1,850,000	Mouth sore. B. P. $\frac{88}{45}$ W.R. negative.	X-ray.	Baby died after 12 days.	..

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81	S.	October 1927.	21	4th	8th	+	+ after confinement.	—	—	..	L.	L.	..	Hb.-20% R.B.C. below one million.	Breathlessness and extreme prostration 7 days after confinement; condition very low. Pulse almost imperceptible: air hunger; rallied nicely. 10-1-30 Pregnant again 6th month. General condition much improved. Hb.-50%. R.B.C. 2,300,000. W.B.C. 7,500. No abnormal cells.	Confined.	Mother, Child both well.	
82	U.	15-3-29	25	5th	8th	+	—	+	Spl.+	..	L.	L.	..	Hb.-20% R.B.C. below one million.	Sore mouth	X-rays.	..	..
83	P.	20-1-30	19	2nd	8th	+	+	+	—	31-1-30	L.	L.	10-2-30	Hb.-40% R.B.C. 1,100,000 W.B.C. 12,000 Normoblasts.	Mouth sore. B. P. 95 W.R. Neg. Urine-Alb. Cult.-Neg.	X-rays.	..	Morbidity.
84	B.	11-1-30	20	1st	8th	+	+	—	+	11-1-30	L.	D.	19-1-30	Hb.-30% R.B.C. 1,960,000 W.B.C. 9,360	..	..	..	Morbidity.
85	F.	4-2-30	27	8th	8th	+	—	—	Liv.+	5-2-30	D.	L.	5-2-30	Hb.-20% R.B.C. below one million.	..	..	..	Died immediately after confinement. Baby healthy.
86	J.	1-2-30	24	6th	6th	+	+	+	—	2-2-30	D.	S. B.	2-2-30	Hb.-20% R.B.C. below one million.	..	..	..	Died immediately after confinement.

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fairly good puerperal period has passed. Iron, arsenic, calcium and intramuscular injections of whole blood have been extensively tried. Recently we have been using abroma angusta liquidum, adrenalin, liver extract and deep *x*-ray treatment. Specific treatment is resorted to where there is a positive Wassermann reaction.

We have noticed that cases in which there is efficient cardiac musculature react well to treatment and adrenalin is used liberally to keep up the tonicity of the cardiac musculature.

Blood transfusion.—We have always given whole blood injections intramuscularly with apparently good results. Cases, desperate otherwise, have reacted well to almost daily intramuscular injections of whole blood to the extent of 15 to 20 cubic centimetres each time (Case 29). But there were other cases (Cases 31 and 61), almost equally bad and desperate, where no blood was available, who got well by our ordinary routine treatment, showing thereby that blood injection, although very useful, is not absolutely indispensable.

Deep x-ray therapy.—Fractional doses of deep *x*-rays (1/10th of the skin erythematous dose according to our Seva-Sadan standard) have been given to the liver, spleen, and over the heads of the long bones to stimulate the reticulo-endothelial apparatus, and the formation of red cells. Reticulo-endothelial cells are chiefly found in (*a*) the splenic pulp, the medullary follicles and cords of lymphatics, and in (*b*) the capillaries of the bone marrow. The reticulo-endothelial system is the site of formation of various protective anti-substances: there is evidence of participation of this system in the process of immunity (e.g., if an animal be injected with small doses of bacteria, there is found to be an enormous and rapid phagocytosis of the injected bacteria by the reticulo-endothelial cells). Reticulo-endothelial tissue can give rise to all types of blood cells in differing circumstances (Piney, 1927).

In our series, 16 patients had deep *x*-ray treatment, of whom 12 had beneficial results (i.e., 15 per cent.). This seems to be very encouraging, but further work and investigation are invited on this particular line, either to corroborate or to discard this line of treatment.

Artificial termination of pregnancy.—The artificial termination of pregnancy is supposed to have a favourable effect on the anæmia of pregnancy, and highly penetrating *x*-rays would be the best agent to kill the fœtus. But *x*-rays are not always successful and it takes a long time sometimes to terminate the pregnancy. Opinions differ regarding the artificial termination. In India, Green-Armytage advocates it, while Kedarnath Das, Bamandas Mukherjee, L. Mudalier, M. Balfour, etc., do not.

Scanning the world literature, we find that favourable results have been obtained by Graefe, Jungmann (1914), Magnes (1911), Steida, Roth, and Audebert and Dalous (1911), by artificial termination of pregnancy.

Meyer-Ruegg and Caruso say that the sooner the pregnancy is terminated, the better is the prognosis. Caruso further says that the presence of megaloblasts is an indication for artificial termination.

Bourret (1911), Fabre, Sauvage, Vincent, Vinay, Commandeur and Quinquand believe artificial termination to be the rational treatment even in spite of the untoward results obtained therefrom. Pregnancy should be terminated if the red blood corpuscle count be below one million.

Doubtful results have been obtained by Olshausen, Zweifel, Bischof, Caripuy and Claude; while it is strongly condemned by Tarnier, Fellner (1903), Labendzinski, Hassencamp, Bauereisen (1911), Jaworsky, Wolff (1914) and Tschertkoff.

These facts lead us to believe that there is no specific treatment for anæmia of pregnancy. The treatment is mainly symptomatic and eliminative as in other toxæmias of pregnancy. Cure is never vouchsafed unless pregnancy terminates. Spontaneous termination is better than artificial. The *x*-rays seem to give favourable results by stimulating the reticulo-endothelial system and the erythropoietic apparatus, but no appreciable result can be obtained when the patient is rapidly going down hill.

Summary.

1. Although rare in Great Britain and on the Continent, anæmia of pregnancy is very common in India.

2. The clinical course is very rapid; and the patient is cured or dead within 6 weeks.

3. The mortality, both maternal and fœtal, is very high.

4. Definite histological changes are found in the liver pointing to a toxæmia of pregnancy. There is degeneration of cells at the centre of the hepatic lobule, and hæmorrhagic areas beyond it, while the peripheral portion is healthy. These changes have been found in four consecutive cases.

5. Thus from the ætiological standpoint it is considered to be a kind of toxæmia of pregnancy.

6. Fractional deep *x*-rays have been used to stimulate the reticulo-endothelial apparatus thereby increasing the immunity and the formation of all kinds of blood cells.

7. The greater frequency of anæmia of pregnancy in India and the associated heavy mortality in spite of all kinds of treatment should demand the attention of all the scientific workers of the day. A thorough investigation regarding ætiology, hæmatology, biochemistry, pathological anatomy, and

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management should be done by team work, and the results brought forward for discussion, criticism, adoption or rejection.

It is due to the initiative and the invaluable suggestions of our Visiting Surgeon, Dr. Bamandas Mukherjee, that I began to work on the problem of anæmia of pregnancy. If there is anything good in this paper it is all due to his kindly instructions. It would have been impossible to do the most valuable part of the work, i.e., the pathological-anatomical portion, if I had not had the practical help of Dr. M. N. De, who prepared all the histological sections for me and gave his valuable opinion and guidance. And I am sincerely grateful to my colleagues and assistants at the Seva-Sadan: Drs. P. K. Guha, J. Singham, W.M.S., B. Mitra, G. Nandy, M. Bose, S. K. Ghosh, the Matron, Miss S. Sarkar, Staff Nurses H. Patrick, P. Singh, and U. Gupta. I thank most heartily also Dr. H. Ghosh for doing special hæmatological work, and also the artist, Mr. Sushil Bhattacharjya, for carefully making photomicrographs of the histological sections.

APPENDIX.

Suggestions for methods of investigation.

Serial No. — Date of admission
Name — Result
Age — Religion — Caste
Name of guardian — Date of discharge
Address
Complaints (noting duration).
Family history.
Personal history.
- A. Environments
  - Housing
  - *Purdah*
- B. Previous illness
  - Time of occurrence
  - Duration
  - Results
- C. Diet at home
- D. Present illness
  - Mode of origin
  - Duration
  - Order in which symptoms appeared
  - Chief symptoms
  - Treatment (if any)

Physical examination.

I. *General condition.*
- Development and nutrition
- Pallor
- Jaundice
- Œdema
- Pigmentation
- Temperature. — Pulse / Respiration

II. *Alimentary system.*
- Appetite
- Vomiting
- Flatulence
- Diarrhœa
- Constipation
- Pain
  - Mouth
  - Teeth and gums
  - Tonsils
  - Tongue
  - Liver
  - Spleen
- Examination of stools { Microscopical / Cultural

III. *Circulatory system.*
- Dyspnœa
- Precordial pain
- Palpitation
- Heart—Apex
  - Precordial thrill
  - Epigastric pulsation
  - Pulsation in neck
  - Percussion
  - Auscultation
  - Blood pressure

Blood examination.
- Hæmoglobin. Red blood corpuscles. — White blood corpuscles.
- Differential count
  - Abnormal cells
- Malarial parasites.
- Aldehyde test.
  - Grouping test
  - Van den Bergh test
  - pH
  - Blood calcium
  - Blood sugar
  - Non-protein nitrogen
  - Creatinin
  - Blood urea

IV. *Urinary system.*
- Quantity. (Compare with intake of fluid.)
- Qualitative and quantitative examination.
- Microscopical examination. Urine culture.

V. *Respiratory system.*

VI. *Nervous system.*
- Tremors, jerks, co-ordination.

VII. *The eye*—ophthalmoscopic examination.

VIII. *Menstrual history.*
- Onset
- Duration — Intervals
- Pain — Amount

IX. *Previous pregnancies.*
- Number
- Full term
- Miscarriage — Abortions
- Vomiting — Headache
- Œdema — Fever

X. *Previous labours.*
- Characters
- Puerperium — Child { Living / Dead

XI. *Present pregnancy.*
- Last menses. (1st day). — Quickening
- Vomiting — Headache
- Œdema — Fever
- Tension — Albuminuria
- Vagina
- Cervix—
  - Culture of cervical smear
- Breast
- Pelvis
- Fœtus— Fœtal heart sounds
  - Presentation

XII. *Labour.*
- 1st stage — Membrane ruptured { Artificially / Spontaneously
- 2nd stage
- Birth at
- Placenta { Crédé / Spontaneously
- Any abnormality
- Post-partum hæmorrhage
- Maternal condition 1 hour post-partum

XIII. *Puerperium.*
- Temperature — Pulse
- Lochia
- Stools
- Urine
- Breasts

XIV. *Child.*
- Alive / Dead — Male / Female — Premature
- Asphyxia — Blue / White
- Condition when leaving hospital.

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XV. Post-mortem examination.
Liver
Spleen
Kidney, suprarenal
Heart
Bone marrow (from tibia)
Intestines

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HÆMANGIOMATOUS MYO-FIBROMATA OF THE UTERUS.

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HÆMANGIOMATA have been found rarely in the uterus. Edmund Horgan (1930) collected 20 cases of hæmangiomata of the uterus from different authors.

Virchow (1863), Oulie, Michel, Reder, Bell and Clarke (1906), Shaw (1913), and Hirschberg (1924), have each reported one case, and Kelly and Cullen (1909) have reported 5 cases of hæmangiomatous fibro-myomata.

True angiomata are rare.

Telangiectasis has only been very partial in its distribution, occurring in limited areas in myomata undergoing necrosis, hyaline degeneration or cystic change.

This condition of dilated vessels is found in tumours which have suffered from mechanical obstruction of their blood supply, such as is generally found in the lower pole of myomatous polypi and in subserous myomata with twisted pedicles. This excessive vascularity has always been associated with necrosis, red degeneration or hyaline and cystic degeneration. It has also been found in myomata, portions of which have undergone sarcomatous changes.

Bishop (1901) thinks that the development of telangiectatic or lymphangiectatic growths is difficult to understand.

Senn believes that they are tumours produced from the matrix of angioblasts and are composed of the vessels of new formations.

Kelly and Cullen (1909) think that the blood supply may be so copious in a fibroid that it becomes an angioma. This excessive vascularity is occasionally noted in the dependent portions of the submucous fibro-myoma; it may also occur when a subperitoneal pedunculated myoma becomes twisted. Angiomatous appearances may be totally independent of any interference with the blood supply.

Hirschberg (1924) found a tumour which contained clotted blood with blood sinuses lined with typical endothelial tissue.

Roger Williams (1901) thinks that in some tumours, especially of the softer variety, the blood vessels and lymphatics occasionally become largely developed, giving the tumour a cavernous aspect. Such tumours may pulsate. These tumours are apt to undergo rapid changes in size, in which muscular contractility and vascular distension are concerned.

Horgan (1930) found hæmangiomatous tissue to be within fibro-myomata which are either interstitial, submucous or subperitoneal.

Shaw (1913) reported a case in which he found an angiomatous fibro-myoma, with the uterus enlarged to the size of a turnip; sections showed the fibro-myomatous tissue to contain a large number of thin-walled blood vessels. Microscopically, they consisted of angiomatous tissue, each vessel lined with a definite layer of endothelium.

Weil found that streaks of protoplasm with nucleated projections, which become laminated in course of time, were projected from the walls of old and new capillary vessels. He found proliferations of endothelial cells which formed buds and projected into the surrounding tissues. These masses of endothelial cells became hollow and received blood from the vessels from which they sprang.

Rokitansky (1846) described the formation of blood spaces in the connective tissue which secondarily become connected with vessels.

Pathology.—The tumour is of dark red colour, and the muscle fibres may be divided into irregular small islets by the abundance of capillaries. Uterine mucosa appears smooth and glistening white. There are numerous dark blue vascular areas composed of blood vessels scattered throughout the tumour, especially in the central portion. These vascular areas present a honeycombed appearance and vary from 0.5 to 3.5 centimetres in diameter. The individual vessels are closely packed together having their walls smooth and glistening. Cystic

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degenerations, of moderate degree, are also seen originating in the melting of hyaline material irregularly scattered in the tumour. These cysts contain a transparent fluid which coagulates on exposure to the air. These small cysts merge into one another having their walls smooth.

Histologically, the tumour is composed of non-striped muscular fibres arranged in bundles and cut both longitudinally and transversely. The angiomatous areas are composed entirely of arteries irregular in outline. The vessels have an endothelial lining and thick circular muscle fibres surrounding them but the greater part of the surrounding layer has undergone hyaline degeneration contrasting sharply with the neighbouring muscle fibres.

Most of the vessels are filled with blood. There are irregular areas of hyaline degeneration frequently in the vicinity of blood vessels. In the areas where softening has occurred, the tissue has undergone complete hyaline degeneration.

Case 1.—A Hindu woman, aged 40, was admitted in the Eden Hospital, on the 20th June, 1930.

The patient's family history had no bearing on the case, neither was there any history of blood or circulatory disease except an attack of epidemic dropsy in 1923 when she had swollen legs and palpitations—this condition was now cured.

Menstrual history.—Menstruation was regular, lasting for 4 or 5 days. The flow was free without any distressing symptoms. Last menstruation was about 5 days ago.

Marital history.—The patient was married when she was only 14 years of age, and had only one child, about 23 years ago. The child is living and well.

History of illness.—Two years ago the patient noticed the gradual enlargement of the lower abdomen. The patient had always been in fairly good health and could carry on the ordinary household duties. She did not complain of any blood discharge.

Physical examination.—The patient was a middle-aged woman of average size.

On palpation.—The abdomen was found occupied by an irregular bulging tumour, cystic in consistency, reaching up to the ensiform cartilage. Dullness was noticed in both the flanks due to the tumour mass. The tumour was mobile. The patient did not complain of any pain. She had no temperature.

Per vaginam.—The cervix could not be felt and was apparently high up behind the symphysis pubis. The whole of the posterior *cul-de-sac* was occupied by the bulging tumour.

Diagnosis.—Broad ligament ovarian cyst displacing the uterus upwards.

Laboratory observations.—Urine was normal; Blood—red blood cells 3,000,000 per c.mm. Hæmoglobin 60 per cent. White blood cells 10,000 per c.mm.

Operation (by Col. Green-Armytage).

The tumour was removed by subtotal hysterectomy. The tumour was intimately connected with the left broad ligament and the left ureter from which it was gently separated.

Macroscopical examination.—A huge subperitoneal fibroid of the uterus, lobulated in appearance, growing from the posterior wall of the uterus into the left broad ligament. The left tube was stretched across the tumour and the left ovary, which was cystic, was displaced. The tumour was dark brown in colour and weighed 22 lbs. 10 ozs. On section, the surfaces showed large caverns filled with blood, and these cystic blood spaces were separated by intervening white fibrous tissue. The tumour did not appear malignant.

Microscopical examination.—This showed numerous large caverns lined by a thin endothelial layer. The tumour was composed of non-striped muscular fibres. Some of the vessels were greatly dilated and they were filled with blood. The greater part in those areas of the tissue where softening had occurred had undergone hyaline degeneration.

Diagnosis.—A telangiectatic fibro-myoma with hyaline degeneration.

Case 2.—Mrs. R., aged 48, admitted on the 8th July, 1930. The patient was anæmic, her condition was low, her pulse was feeble and she was bleeding profusely at the time of admission. There was a huge submucous polypus of the size of a fœtal head hanging out of the cervix. The tumour was pulsating and was attached by a stalk to the cervix.

Laboratory observations.

Blood count—red blood cells—2,300,000 per c.mm.

White blood cells—7,000 per c.mm.

Hæmoglobin—40 per cent.

Differential count—Polymorphonuclears—70 per cent.

Lymphocytes—27 per cent.

Monocytes—nil.

Eosinophils—3 per cent.

A few normoblasts were present. There were anisocytosis and poikilocytosis.

Urine showed no abnormality.

The patient had had an attack of epidemic dropsy 2 years before the date of admission. Her marital and obstetrical history had no bearing on the case. The tumour was removed by Col. Green-Armytage by an operation through the vagina. The patient was discharged after recovery on the 15th July, 1930.

Macroscopical appearance.—A pear-shaped tumour of the size of a bullock's heart, which was soft in consistency. On section, the cut surfaces showed cystic blood spaces which were more marked in the dependent portion of the tumour at its periphery. The central portions of the tumour consisted of spongy tissue.

Microscopic appearance.—Hæmangiomatous as well as lymphangiomatous changes, which gave the tumour a cavernous aspect, had occurred. (This corresponds to tumours described by Roger Williams in which muscular contractility and vascular distention are concerned.)

Diagnosis.—Angiomatous myo-fibroma showing hæmangiomatous as well as lymphangiomatous changes.

Case 3.—The tumour was removed by subtotal hysterectomy by Col. Leicester in 1924 and sent to the department of pathology.

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Fig. 1. Case 1.—Tumour intact; the uterus was buried in the tumour mass. The cervix is shown by a stick introduced into it. The wedge-shaped lobe of the tumour was in the pouch of Douglas.

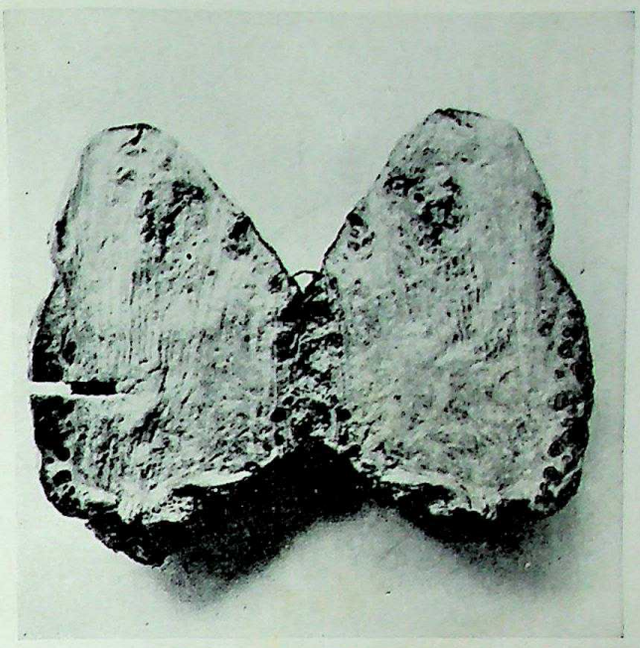

Fig. 4. Case 2.—The cut surfaces show cystic blood spaces which are particularly marked at the periphery.

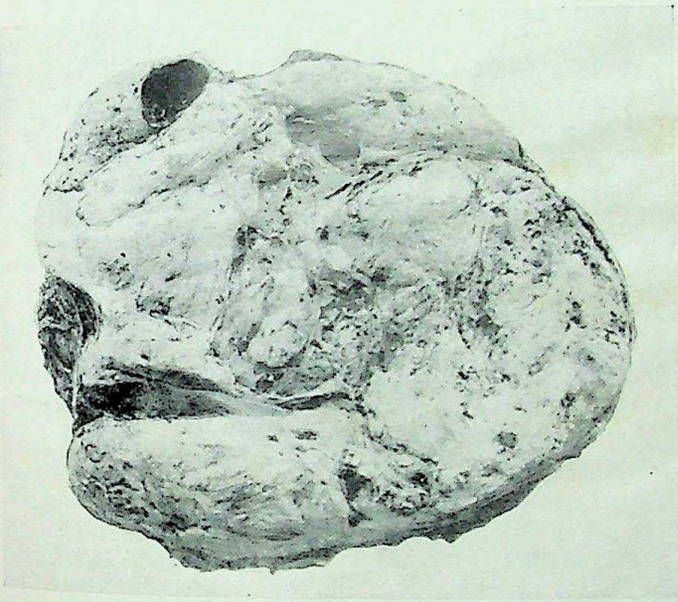

Fig. 2. Case 1.—The cut surfaces of the tumour show large caverns filled with blood, and cystic blood spaces are separated by intervening fibrous tissue.

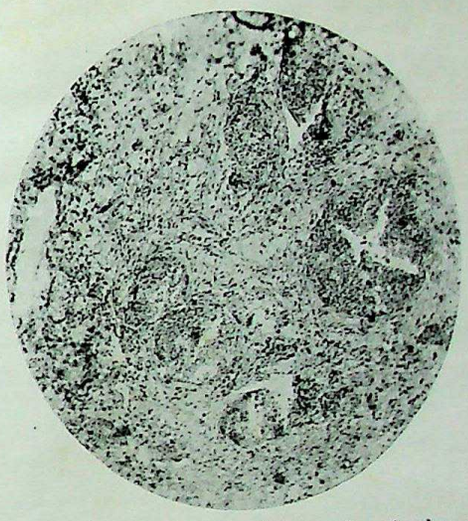

Fig. 5. Case 2.—Photomicrograph of the tumour shows hæmangiomatous as well as lymphangiomatous changes. (Low power.)

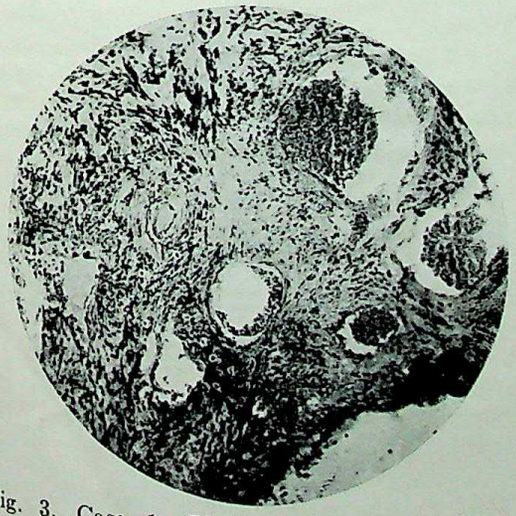

Fig. 3. Case 1.—Photomicrograph of the tumour shows large number of vessels which are filled with blood, hyaline degeneration and cystic change. (Low power.)

Fig. 6. Case 3.—The tumour presents a honeycombed appearance. Numerous dark blue vascular areas and masses of cystic degeneration are shown.

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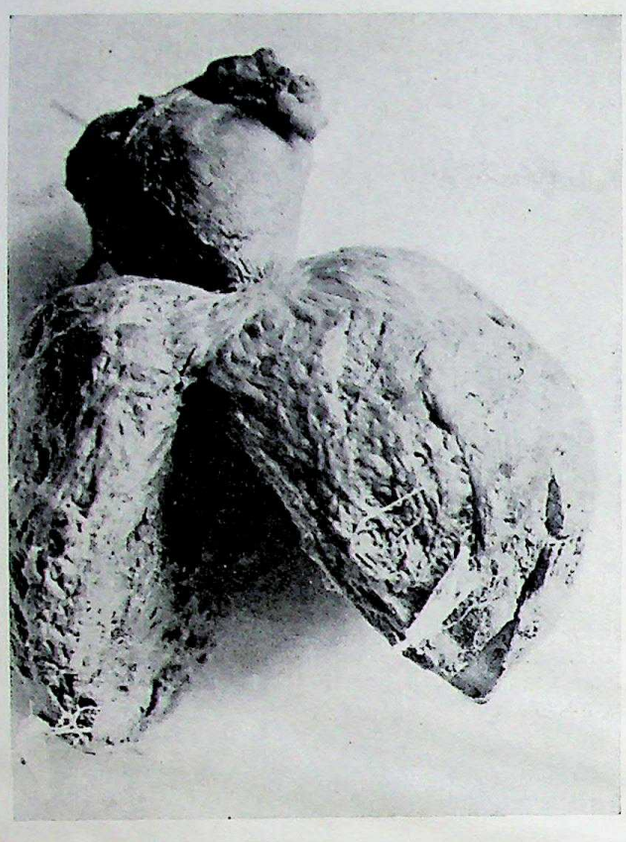

Fig. 7. Case 4.—A subperitoneal fibroid growing from the right cornu of the uterus by a twisted short pedicle. Cystic blood spaces are seen on the external surface of the tumour which has assumed a pitted appearance. Cut surfaces show blood sinuses.

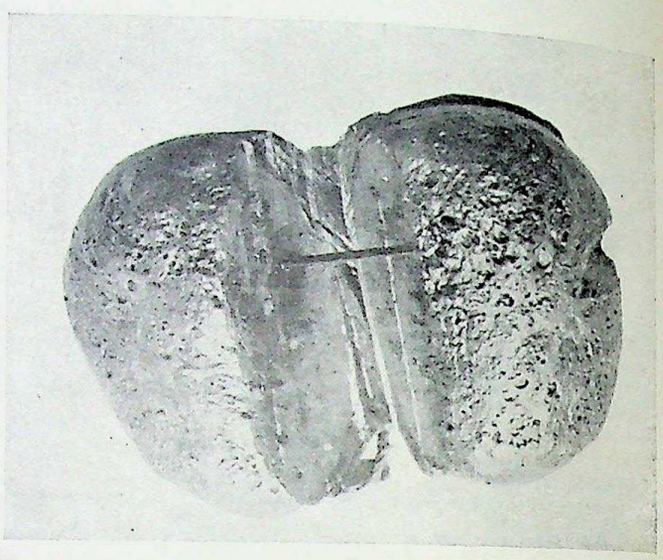

Fig. 8. Case 5.—The cut surfaces of the tumour show a mottled appearance exhibiting a large number of dark purplish compartments and small cystic spaces with gelatinous material, and white fibrous tissue is intervening between them.

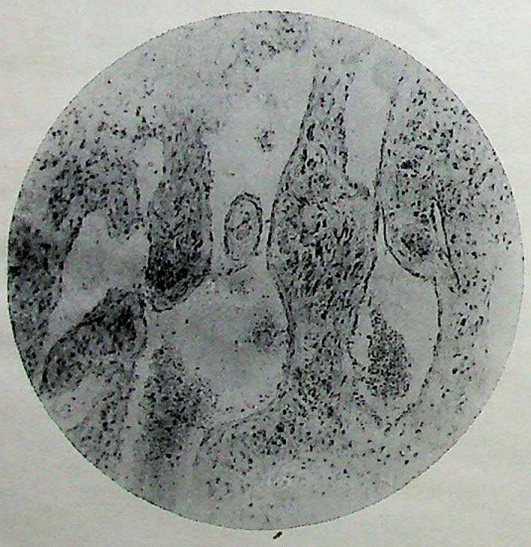

Fig. 9. Case 5.—Photomicrograph shows formations of new blood spaces in the connective tissue and small islets of soft fibrous and myomatous tissue intervening between them. (Low power.)

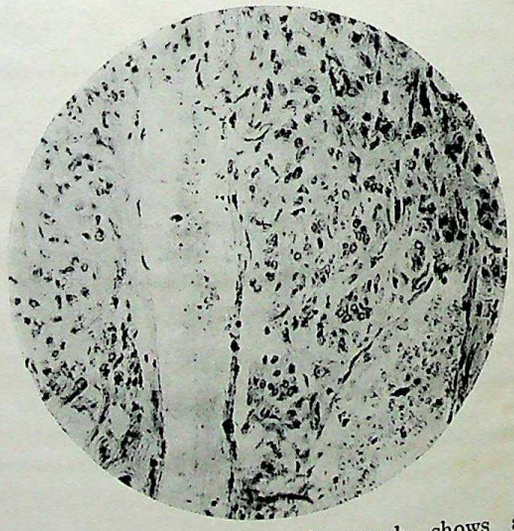

Fig. 10. Case 5.—Photomicrograph shows actual proliferation of endothelial cells which line the blood sinuses. (High power.)

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Macroscopical appearance.—A tumour of the uterus, of the size of an ordinary melon, was rather cystic in consistency and appeared to be of dark red colour. On section, the tumour was found occupying the entire lumen of the uterus and also invading the uterine wall. The cut surfaces, especially in the central portions, showed numerous dark blue vascular areas composed of blood vessels from which blood escaped. These areas presented a honeycombed appearance. The individual vessels were closely packed together; vessel walls were smooth; large masses of cystic degeneration were also present. The cysts contained transparent fluid which coagulated after fixation in mounting fluid.

Microscopic appearance.—The dark blue angiomatous areas were composed of irregular vessels which had an endothelial lining and were filled with blood; muscle fibres were divided into small irregular spheres by the abundance of capillaries. Bundles of muscular fibres had undergone hyaline degeneration and cysts were formed which were irregularly scattered in the tumour in and near about the blood vessels. In the degenerated areas there was a formation of capillaries the walls of which were formed of fibrous tissue with ill-defined endothelial lining which could be seen under the oil immersion lens.

Diagnosis.—Hæmangiomatous myo-fibroma with cystic changes.

Case 4.—A Hindu woman, aged 40, was admitted in the Eden Hospital on the 14th March, 1928. She looked ill-nourished.

Menstrual history.—Menstruation began when she was 16 years of age; it was of regular occurrence and of 5 or 6 days duration. The flow was free without any cramps or backache. Last menstruation was one year ago.

Obstetrical history.—She had had six children, three of them had died. There was no abortion. Last pregnancy was 10 years ago. She gave no history of difficult labour. She complained of no cardiac or vascular disease.

History of present illness.—Patient felt a swelling in her lower abdomen for the last two years for which she sought admission in the Eden Hospital. Physical examination revealed a mobile smooth tumour, of the size of a football, below in the pelvis. There was free fluid in the abdomen.

Vaginal examination.—The uterus was found small and discrete, the right cul was slightly resistant; the left cul was clear; and the cervix was small and hard.

Diagnosis.—Fibroid of the uterus undergoing malignant changes with ascites.

Laboratory observations.

Cytodiagnosis of the ascitic fluid.—The fluid was an exudate; Rivalta's test was positive.

Leucocytes—700 per c.mm.

Erythrocytes—present in fair numbers.

Differential count.—Neutrophiles—36 per cent.

Lymphocytes—64 per cent.

A few endothelial cells also present.

Blood count.—Leucocytes—15,000 per c.mm.

Erythrocytes—2,700,000 per c.mm.

Hæmoglobin—40 per cent.

Differential count.—Neutrophiles—75 per cent.

Lymphocytes—21 per cent.

Monocytes—3 per cent.

Eosinophils—1 per cent.

A few normoblasts, anisocytosis and poikilocytosis were present.

Operation (by Col. Green-Armytage on the 19th March, 1928).

The abdomen was opened by a right paramedian incision, and several pints of grumous fluid escaped. There was a vascular pulsating tumour growing from the top of the uterus which was adherent to the coils of intestine and the greater omentum. The tumour with the uterus and its appendages was removed by subtotal hysterectomy and bilateral salpingo-oophorectomy.

Macroscopic appearance.—A subperitoneal fibroid of the size of a fœtal head growing from the posterior surface of the right cornu of the uterus by a twisted short pedicle of the thickness of an index finger.

The tumour was hard in consistency and cystic blood spaces were seen on the external surface of the tumour which assumed a pitted appearance. The site of adhesion with the intestine was marked by an aperture in the wall of a blood sinus.

On section, the cut surfaces appeared brownish-red in colour; blood simply oozed out from the blood sinuses leaving rather an irregular worm-eaten appearance. Whorls of fibrous tissue made the unquestionable macroscopic diagnosis of fibro-myoma. The capsule was thick and could be separated easily. It had neither the soft consistency nor the brain-like degenerating appearance of a malignant tumour.

Microscopic appearance.—The tumour was composed of non-striped muscular fibres and bundles of fibrous tissue cut both longitudinally and transversely. There was a large number of thin walled blood vessels, each of them lined with a definite layer of endothelium. The vessels contained red blood corpuscles. The angiomatous changes were particularly marked in the loose fibrous capsule. There were hæmorrhages within the connective tissue and the big arteries were all congested. It did not show any sign of malignancy.

The patient left the hospital on the 4th of April, 1928, and was advised to come to the hospital after a month, but she has not appeared since then.

Diagnosis.—Hæmangio-myofibroma.

The case was interesting because there was escape of blood from the wall of a cavern of the hæmangioma into the peritoneal cavity. The escape of blood resulted from a gradually increasing tension within the cavern by the twisting of the pedicle and as a result of rupture there was inflammation and the tumour was glued to the coils of intestine at this site.

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Case 5.—The tumour was removed by subtotal hysterectomy and double salpingo-oophorectomy by Col. Leicester in 1923 and was sent to this department.

Macroscopic appearance.—It was a sub-peritoneal tumour of the size and shape of a shaddock arising from the posterior wall of the uterus. The tumour was growing on the left side and pushed the uterus to the right side. The cavity of the uterus was increased by half an inch. The endometrium of the uterus was smooth. The tube and the ovary on either side were *in situ;* the left ovary was of the size of a green almond and was found cystic in one area and the rest of the organ appeared fibrosed.

The tumour was fairly firm in consistency. The cut surfaces bulged out and showed the appearance of a beehive. They were of pink-red colour and had rather a mottled appearance exhibiting a large number of dark purplish compartments and small cystic spaces filled with gelatinous material; white fibrous trabeculæ intervened between them. The tumour exhibited this appearance throughout its entire thickness. The tumour had a thick fibrous capsule.

Microscopic examination.—This showed abundance of large cavities filled with blood. These were blood sinuses of irregular outline which had an endothelial lining. Small islets of soft fibrous tissue and transversely-cut muscle fibres intervened between them.

There were proliferations of endothelial cells and formations of new blood spaces in the connective tissue which were afterwards connected with vessels. There were also irregular areas of hyaline degeneration in the vicinity of blood vessels. This tumour represented true angiomatous changes in a myo-fibroma.

The histological appearance of this case differed from the rest in its affinity with sarcoma.

Diagnosis.—Hæmangiomatous myo-fibroma with hyaline degeneration.

Discussion.—Angiomatous changes in fibro-myomata are, generally speaking, rare, but they are not infrequently encountered in the tropics particularly in Bengal where the people suffer from epidemic dropsy. Out of 6,000 specimens received by the department of pathology from the Eden Hospital during the last 10 years, 5 cases of angiomatous changes in myo-fibromata were encountered. Out of these five cases reported in this paper, only two gave a definite history of a previous attack of epidemic dropsy. It is dangerous to ascribe any reasonable connection with angiomatous changes in fibro-myomata to epidemic dropsy as such cases occurred in places where people do not suffer from epidemic dropsy. The histological appearance of the angiomatous changes of the myo-fibromata is as interesting as the morbid histology of the epidemic dropsy. In a few post-mortems on epidemic dropsy, Major Shanks (1931) found a definite telangiectatic change of the blood vessels in situations where the vessels were least supported.

Von Noorden (1907) thinks that toxic substances which are retained or formed in the body may increase the attractive capacity of the blood and especially of the tissues for water. This idea has been supported by the investigations of Cohnheim and Lichtheium. They have shown that the presence of certain poisons in the blood makes the walls of the capillaries more pervious and stimulates them to active secretion.

An analogy between the angiomatous condition of epidemic dropsy in tissue which suffers from œdema and apparently starves from want of proper nutrition and blood supply, to this nævoid change of the fibro-myomata where the tissue suffers from malnutrition from mechanical obstruction seems obvious. It is curious that angiomatous changes should appear in such conditions.

None of the cases with the history of epidemic dropsy showed angiomatous changes in any other part of the body.

Summary.

1. Hysterectomy was performed for angiomatous changes in fibro-myomata and all the cases reported in this paper recovered uneventfully.

2. All the cases of this paper were of middle age.

3. Angiomatous changes were found in tumours which suffered from mechanical obstruction of their blood supply, in myomatous polypi particularly in the lower poles (Case 2), and in subserous fibro-myoma with twisted pedicle (Case 4), and as a result suffered from hyaline or cystic degeneration—particularly manifested in Cases 1 and 4. A true angiomatous change was found in Case 5.

4. Angiomatous fibro-myomata may simulate the characters of a malignant tumour in the peritoneal cavity (Case 4).

My thanks are due to Col. J. C. H. Leicester, M.D., F.R.C.P., F.R.C.S., I.M.S. (retired), and to Lieut.-Col. V. B. Green-Armytage, M.D., F.R.C.P., I.M.S., Professors of Obstetrics and Gynæcology and Surgeons of the Eden Hospital, for permission to work on their cases and also to Major G. Shanks, M.D., I.M.S. (retired), and to Dr. T. Sur, M.D., Professors of Pathology, Medical College, Calcutta, for giving me every facility in the work.

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ORIENTAL SORE.*

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ORIENTAL sore is a disease which is sufficiently prevalent in the Punjab to attract considerable attention, and it is one of those minor ailments which worry very much the minds of the persons suffering from them. In the course of this paper, I have attempted to place before you the results of some methods employed by me in the treatment of the disease.

The disease may be defined as a specific ulcerative condition of the skin caused by a special protozoal organism.

In India the disease is known by various names, such as Frontier sore, Lahore sore, Delhi boil, local sore, etc. However, all such names are misleading, for the disease is not confined to any particular locality in India, nor for that matter to India alone, nor again to oriental countries only. It is best to call it cutaneous leishmaniasis, because of its causation, and because of the cutaneous nature of the lesion.

Its distribution is very wide. It is endemic in many tropical and subtropical regions—it is also found in temperate zones. It occurs to a great extent among the peoples of India, Arabia, Iraq, Persia, Syria, Asia Minor, Turkey, Greece, and Egypt. Cases have also been reported from Italy.

It is more common in large towns than in the country side; and in countries where it is endemic its distribution is not general, but is confined to certain districts only.

It is most prevalent at the end of the summer and at the beginning of the cold weather.

Ætiology.†—The causal organism is a protozoal parasite, *Leishmania tropica*. Recent work suggests that the infection is probably carried from man to man by the agency of the sand-flies, *Phlebotomus papatassii* and *Phlebotomus sergenti*.

The avoidance of the bites of these sand-flies is the only prophylactic measure that can be advocated.

Signs and symptoms.—Incubation period is uncertain; it may be as short as 10–14 days, or it may be as long as six months or even more.

The sore may appear on any part of the body, but the usual sites are the exposed parts.

It attacks people of any race, sex, and age, who expose themselves to infection. Occupation and social position do not seem materially to influence susceptibility.

There may be a single sore on the body, or multiple sores may appear from auto-inoculation as a result of scratching. Usually there are two or three on the same patient; occasionally, there are many more. Torres (in 1920) in South America recorded a case in which he observed as many as 248 distinct sores on the body of a single individual.

In Iraq, where it is mostly known as Baghdad boil, some of the lesions are very extensive. Some of those seen by me among the inhabitants there, while I was in that country, were so big that they looked like new growths.

As a rule, the patient does not complain of any constitutional symptoms when infected with the disease in the natural manner.

It has already been noted that Wenyon and others, in the course of experimental work upon themselves, suffered from fever, etc., in association with the sore produced on them from infection produced artificially. This question of constitutional symptoms in the disease, therefore, needs further careful study. In any case, it is known that constitutional symptoms in the form of fever, etc., do occur in patients suffering from multiple sores.

The local manifestation of the disease is very variable indeed. It may show itself as anything from a mere superficial erosion to big diffuse indurated masses, looking like warty outgrowths or granulomata.

The disease commences as a small red papule, shotty to feel, its surface being covered with a reddish brown scale. The appearance suggests very much a mosquito bite mark, but it is less irritating than the latter, and causes little discomfort locally.

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*Read at the fortnightly meeting of the British Medical Association, Punjab Branch, on 17th December, 1930.

† It has been necessary, in the interests of economy in space, to exclude some of the writer's notes on ætiology and prophylaxis.

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If left unattended to, the papule gradually becomes bigger, purplish in colour, more markedly scaled, and surrounded by a narrow area of chronic inflammation, which later becomes markedly indurated. There is still no pain or discomfort, but there may be a slight feeling of itching around it.

This, in course of time, may get resolved and disappear, leaving a purplish scar behind. Or it may give rise to local points of softening with scab formation, the surface of the scab being cracked at several places. Through these cracks a yellowish-white exudate starts oozing. The process of softening continues to spread slowly under the scab, and in course of time, varying from 3 weeks to 3 to 4 months, the scab gives way, frequently as a result of some slight injury, and actual ulceration is the result. The ulcer has a sharp-cut edge with a jagged margin, and an irregularly raised base with reddish-yellow granulations. The ulcer, when unaccompanied by any secondary infection or sepsis, is painless and superficial, and the neighbouring lymph glands are not perceptibly enlarged, as a rule. It is surrounded by an area of marked induration and redness in which there is active growth and multiplication of the parasites. It exudes a dirty yellowish discharge and becomes covered with a tough adherent dark crust.

Spontaneous cure may occur. In such cases healing sets in in from 4 to 12 months, the unhealthy yellowish granulations being replaced by healthy pinkish ones. Ultimately, a whitish or pinkish scar is left behind, which may be depressed. Contraction of the cicatrix may result in considerable deformity. After cicatrization, however, the sore may break down again.

Secondary septic infection may take place in the ulcer. The discharge becomes purulent and the ulcer foul-smelling; then the lymph glands of the area get enlarged. Except when complicated by this superadded secondary sepsis, in which case it may become a source of serious danger, an oriental sore is troublesome and unsightly rather than painful or dangerous.

Diagnosis.—The differential diagnosis from other ulcerative conditions, both simple and specific, is of importance. The distinguishing clinical features are:—

1. The distribution on the body.
2. The raised base.
3. The surrounding red hard areola (induration).
4. The absence of any local discomfort, except perhaps a slight feeling of itching.

But, diagnosis can be made with any certainty only by finding the specific organism with the aid of the microscope in films made from scrapings and exudate taken by a puncture of the spreading indurated circumference of the sore. The films should be stained by Leishman's stain. Sometimes, it may be necessary to try the cultural method of isolating the parasite.

Treatment.—I have only considered such methods of treatment here as are in common use in these days, and have recorded the results of my own experience while employing them in dealing with cases of the disease.

Contrary to the fear of the general public, I believe that an oriental sore is not difficult to get rid of, provided it is recognised early and treated properly. A great many of the failures or delays in cure are the result either of late diagnosis or of neglect in treatment. Either the patient has waited too long before applying for treatment, or he has passed through the hands of many a quack before coming under the care of a properly qualified man. Yet, in some few cases a number of our own profession are probably to blame. Some of us forget that the treatment of oriental sore comes under the care of the surgeon, and put all our faith in the use of drugs in treating ulcerative conditions. In this hunt for newer and more efficacious drugs the principles of surgery are ignored.

Another fact that needs to be pointed out in this connection is that a person suffering from oriental sore is almost always greatly run down in general health. Therefore, all the different methods of treatment described below should be supplemented by care of the general health of the individual concerned. More often than not, the person is anæmic, debilitated, or chronically constipated. These and any other body state needing correction should be attended to in order to obtain the desired results of the particular treatment adopted.

The different methods of treatment I wish to bring to your notice are:—

Application of carbon dioxide snow locally to the sore.—This is the method employed as a routine for treating the crowd of patients suffering from this disease attending the out-patient department of the Mayo Hospital, Lahore.

Carbon dioxide is available as gas stored under pressure in iron cylinders. (In the Punjab, it costs Rs. 20 per cylinder, exclusive of the cost of the cylinder.) On a rough calculation, the quantity of gas contained in one such cylinder is sufficient for applications to about 200 sores, and, as I will show by citing cases, about 3 applications are needed to cure a single sore in the early stage; it follows that the cost of curing such a sore by this method is as low as five annas only.

I have gone into these petty details intentionally, so that I may bring to your notice a point hitherto lost sight of, namely, that the cost of this form of treatment is so low that individual practitioners and *mofussil* hospitals can equip themselves with it without any difficulty.

The method of preparing snow from the carbon dioxide gas and the mode of its

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application are quite simple. The snow is applied to the sore in the form of thin round sticks or pencils.

The snow and its pencils are made as follows:—

A sheet of blotting paper is rolled around a wooden ruler, this is covered with cotton-wool padding, and wrapped in a roller bandage. The ruler is then withdrawn, and the tube thus formed is applied to the tap of the gas cylinder in such a way that no leakage will take place. The tap is relaxed and the gas, which is stored in the cylinder under pressure, is allowed to escape into the blotting paper tube until the latter becomes full of snow. This is emptied into metal moulds of the shape of pencils, and beaten to that shape by metal rods provided for the purpose. The pencils thus made are wrapped in pads of cotton-wool to prevent their rapid melting by exposure and handling.

Applications are made all round the indurated periphery of the sore, where proliferation of the causal organism takes place. The point of the snow pencil is applied with moderate pressure for a duration varying from 10 to 30 or 40 seconds, depending upon the severity of the infection and the condition of the sore. The position of the pencil is moved continually over the zone to be treated, until a complete application is made over the whole of the indurated margin. By this means, the site of activity of the parasite is changed to an area no longer favourable to its growth and multiplication. Thereafter, the treatment of the sore becomes a matter of surgical care requiring the application of proper dressings.

Such applications of carbon dioxide snow are made once a week, and the number of applications required to effect cure in a sore depends upon the extent of the infection and the stage to which the sore has advanced.

Many a time it is necessary to apply the carbon dioxide over the whole surface of the sore also, with a view to creating an ulcerating surface, which under proper care hastens the process of healing. Or else, the scab on the surface of the sore has to be got rid of by the application of starch and boric acid poultices before making applications of carbon dioxide snow.

Regarding the duration of 30 to 40 seconds for one application, my personal experience is that it is better to make 3 or 4 interrupted applications of 10 seconds each rather than a continuous single application of 3 to 4 times that duration. For instance, I start at a point on the circumference and applying the carbon dioxide stick for 10 seconds proceed on to the next point, and so on round the whole periphery of the sore, till I come back to the point where I started; then I carry on a second round of applications of further 10 seconds at each point, and so on for 3 or 4 times.

Not infrequently, a blister rises over the sites of application of the snow, in about 24–36 hours. This is of no consequence—although it gives alarm to the patient—and needs only to be pricked aseptically and dressed with the same care.

I have collected a few figures to show the value of this form of treatment in the different varieties of sores met with in those suffering from the disease. The number investigated is not high, but composing reliable statistics has not been an easy matter. Apart from departmental and administrative difficulties, the conduct of the patients has been most discouraging. A large number of them never returned after the first day of their treatment. They were believers in what one may call the "miracle therapy." Those who did want to complete the treatment disputed one's right of doing any "research work" on them. Under the circumstances, I have been able to collect facts only for 50 sores occurring in 30 cases. For the sake of studying the comparative value of the different methods used in the treatment of the disease, the lesions of oriental sore were classified into 4 types as follows:—

1st type.—Where there is only a papule covered with a reddish-brown scale.

2nd type.—Where there is a raised area of inflamed tissue covered with a scab, the latter cracked at places and exuding serous discharge, the whole surrounded by an area of chronic inflammation, but without actual ulceration.

3rd type.—Raised ulcerating surface—but not septic—surrounded by a hard indurated red periphery.

4th type.—Septic ulcer, discharging pus, having an extensive raised base and a hard indurated brown circumference.

The following table gives details of the number of cases belonging to each of these types treated by applications of carbon dioxide snow and their results. They relate to a total of 50 sores occurring in 30 cases of the disease.

As stated in the table given below, cases with sores of the 4th type (suffering from secondary sepsis) were not given any application of carbon dioxide snow till they were free of the sepsis.

The analysis of the figures given in the table shows that cases with mild infection and cases in which inflammatory changes are not too far advanced are effectively treated by this method with promise of an early cure. In other cases the value of this form of treatment is doubtful, or at best uncertain.

Most of the cases treated in the above manner were suffering from one sore each on their persons. A few had two sores each, and two or three had a third sore as well on them.

Intravenous antimony therapy.

The second method of treatment employed in this disease is by intravenous injection of a

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Type of sore.	Number of cases of each type treated.	Results of the treatment shown as weeks after which cure was effected.												Left uncured after twelve weeks.
		1	2	3	4	5	6	7	8	9	10	11	12	
1st ...	7	..	1	4	2	..	..	..	..	..	..	..	..	..
2nd ..	19	..	..	2	3	7	4	3	..	..	..	..	..	..
3rd ..	13	..	..	..	..	1	..	1	3	1	..	..	..	..
4th ..	11	No snow applied until sepsis disappeared.	..	..	..	..	..	1	..	..	1	..	1	6
												..	2	7

solution of tartar emetic. This is a method used as a routine at the Mayo Hospital here, for cases of the disease suffering from multiple sores on the body, that is to say, for those having more than two or three sores on their persons. This method was also used for some of the cases with only two or three sores on them, when they were not yielding quickly enough to the applications of carbon dioxide snow alone. Local applications of carbon dioxide snow or some medicinal preparation on individual sores had always to be carried out with this form of treatment—the intravenous injection—in cases of multiple sores.

The solution of tartar emetic was made in freshly prepared distilled water. The strength of the solution employed was either one per cent. or two per cent. and the quantity varied from 1 to 5 c.cms. depending upon the condition of the sore and the duration of the disease. The injections were given, usually, twice in a week, but in severer cases a start was made by giving injections every alternate day for a week or ten days, and then carrying them on twice weekly till cure was affected. The vein at the bend of the elbow was the one selected for giving the injections.

In ordinary cases 8 to 12 injections given twice weekly were sufficient to cure a condition of about 3 to 4 sores on the body. To start with, 1 c.cm. of a 1 per cent. solution was injected, it was increased to 2 c.cms. of a 1 per cent. solution and finally 2 c.cms. of a 2 per cent. solution were given.

Severer cases, in which the dose of the solution injected was eventually raised to 5 c.cms. of a 2 per cent. solution, took from 18 to 20 injections, of which the first seven or eight were given every alternate day and the remaining twice weekly. One case received as many as 30 injections before the condition cleared up.

This method of treatment is the only one proved to be of definite value in cases with multiple sores on the body. Cases have been reported which were treated by intravenous injections made with solutions of Neosalvarsan, Novarsenobenzol and the allied arsenical preparations, but the results were not as satisfactory.

In this connection I wish to mention the result of tests carried out by myself with another drug. Some time in 1928, a sample packet of sealed ampoules of "Urea Stibol powder" was received at the Mayo Hospital dispensary, for testing the effect of the drug in the treatment of oriental sore by intravenous injection of its solution in distilled water. A few of these ampoules were forwarded to me for carrying out the necessary tests and reporting the result. I reproduce below the report made by me in this connection at the time.

"The treatment consisted in giving a course of five intravenous injections at intervals of one week each of 1 c.c. of a solution of 'Urea Stibol' in distilled water in the following doses:—1st injection 0.05 gramme, 2nd injection 0.10 gramme, 3rd injection 0.15 gramme, 4th injection 0.20 gramme and 5th injection 0.20 gramme. Altogether 10 cases were treated. Only four of these attended regularly to receive the whole course of 5 injections each. The results in these four cases were as follows:—One case with only one sore on the wrist showed some improvement at the end of the 5th or last injection, but total cure resulted from two weekly applications with carbon dioxide snow made after completion of the course of 'Urea Stibol.' Two other cases with three sores each on different parts of the body showed slight improvement by the full course of this treatment. Recovery in these cases eventually took place with berberine sulphate treatment (to be described below). The fourth case was one of multiple sores of the arms, legs, and face; and this showed no change with the treatment. It eventually recovered by prolonged treatment with intravenous injections of tartar emetic."

Berberine sulphate.—The third method of treatment I wish to describe is by intra-dermal injection of a solution of berberine sulphate round the margins of the sore.

In 1926 I came across a description in the *Indian Medical Gazette*, Calcutta, of cases of oriental sore treated by this substance

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giving satisfactory results. This led me to treat my first case with this method. A male aged 28 had on the back of the forearm a sore of the 4th type (described above.) One-fourth grain of berberine sulphate powder dissolved in 1 c.c. of fresh distilled water was injected by means of a hypodermic syringe into the subcutaneous tissues around the sore. The patient complained of a lot of pain at the time of the injection, and when seen by me 24 hours later, had a swollen forearm with acute inflammation of the sore and of an area 2 inches all round it. For the time being it produced some disappointment; but later, further accounts of cases treated by this method were published, and this induced me to try it again on cases here. This time a selection was made of cases treated in this manner.

The points in selection of cases were:—

(*a*) The treatment was applied only to positive cases. Diagnosis was first confirmed microscopically.

(*b*) It was not applied to cases suffering from acute inflammation of the sore, or from secondary sepsis existing in it, till such cases were first cleared of all sepsis and till signs of acute inflammation subsided.

(*c*) Positive cases free from secondary sepsis and from signs of acute inflammation were given treatment without any delay.

It will be of interest to point out that berberine sulphate, the substance used for injection in this method, is prepared from the bark of *Berberis aristata* (which, in Northern India, is known by the name of *Rasout*, and is a popular home remedy in many affections of the skin). The sulphate is bright yellow in colour and soluble in water, 1 in 150. Its cost is very little.

A fresh solution was prepared each time the injection was given. Freshly prepared distilled water was taken, first boiled and then allowed to cool. A 2 per cent. solution of berberine sulphate was made with this. Injection was given with a fine needle, fitted on to a hypodermic syringe, intradermally into the tissues round the periphery of the sore and the injection was repeated once in a week. The number of injections required to cure a sore depended upon its condition. To determine the duration of the treatment and its value as a remedy for the disease, records were maintained of cases of different types of sore treated in this manner. The same serious difficulty was encountered now as on previous occasions that many patients did not complete the full course of treatment. Figures tabulated below refer only to such cases who underwent the treatment to the end, i.e., until they were cured. They relate to 23 sores occurring in 19 patients. Most of the patients had one sore on the body, only a few had two.

Type of sore.	Number of sores treated.	Results of the treatment shown as weeks after which cure was effected.						Left over uncured after six weeks.
		1	2	3	4	5	6	
1st ..	4	1	3	..	..	..	..	..
2nd ..	9	..	1	7	1	..	..	..
3rd ..	6	No injection till inflammation subsided.	..	2	3	1	..	..
4th ..	4	No injection till ulcer free of sepsis.	..	..	1	2	1	

An analysis of the figures given above shows that the treatment was valuable in all types of the sore provided diagnosis was definite and the state of the ulcer not septic or acutely inflamed. These results are in conformity with the findings of other workers.

Moreover, the treatment is so cheap and the technique so simple that it can be used by a practitioner placed in any circumstance.

Emetine hydrochloride.—While describing cases treated by subcutaneous injections, I am reminded of a positive case of oriental sore treated by hypodermic injection of 1 c.c. of a 2 per cent. solution of emetine hydrochloride—around the sore. Four injections were given at intervals of 4 days each, and the sore treated with an ointment made of quinine hydrochloride in vaseline of grains 80 to the ounce strength, during the whole period when the injections were being given and thereafter. The sore healed in about 7 weeks.

Other methods.—The radical method of treating oriental sore by excision or scraping results in a certain cure, but its great disadvantage is the extensive scar that is left behind. Moreover, patients will not consent to it readily. However, this method of treatment is the only possible way of dealing with extensive lesions, such as one comes across on the North-West Frontier in India, and in Iraq and Khurdistan.

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The operation is a simple one and can be performed under local anæsthesia.

The disease has also been treated by means of diathermy and *x*-ray exposures, in England and in other countries; and I remember a colleague in India treating cases with magnesium sulphate ionisation. The results, however, have not been very conclusive.

Among a large number of ointments and other substances employed locally in the treatment of the disease, the only one which needs a consideration is tartrate of antimony ointment. The sores are first cleared of secondary sepsis, if any, by ordinary surgical dressings; and if covered with scabs, the same are first got rid of by applications of boric acid and starch poultices, before applying the ointment. It is used in a 2 per cent. strength and is applied daily over the sore for 3 or 4 days or longer till an ulcer is formed and the induration has disappeared. It is then dressed daily with sterilised vaseline or boric ointment, taking all the necessary aseptic precautions. Some people advise the application of a dressing of cheese freshly prepared from milk curds, after previous treatment with the tartrate of antimony ointment. I have not discovered any advantage of this over the boric ointment dressing.

Reference may be made here to the fact that some few cases of this disease are also treated by the Indian barber, who still exists in our midst as a relic of the surgeon of the Middle Ages. He trades in a large number of combinations of herbs suspended in oil or grease, for local applications. And, it is claimed that by these he "cures" the sufferers of oriental sore. What we do know, however, is that some of these cases come to the surgeon afterwards, to undergo an operation of some kind or other.

Conclusions.

The conclusions we arrive at are as follows:—

1. The diagnosis should be made early by examining the exudate or scrapings of the tissues taken from the edge of the sore.

2. For purposes of treatment, it is advisable to recognise different types of the sore, according to the severity of the infection, extent of inflammatory processes, presence or otherwise of secondary sepsis, and the number of sores present on the body.

3. Sepsis and acute inflammation, if any, should be treated first before specific treatment is commenced.

4. In the absence of auto-inoculation, i.e., when sores on the body are not multiple, treatment with berberine sulphate gives the most satisfactory results. Early cases with a single or two small sores on the body yield equally satisfactorily to treatment by applications of carbon dioxide snow.

5. When auto-inoculation accompanied by multiple sores on the body is present, intravenous injection of tartar emetic solution combined with some form of local treatment gives the best results.

THE VALUE OF THE "SERGENTS' METHOD" FOR DETECTING MALARIAL INFECTION IN MOSQUITOES.

By C. STRICKLAND, M.A., M.D.,
Professor of Medical Entomology,
and
D. N. ROY, M.B., D.T.M.,
Assistant Professor of Medical Entomology, School of Tropical Medicine, Calcutta.

THE usual method adopted for the detection of Plasmodium sporozoites in anophelines has of course been the rather laborious dissection of the salivary glands of the mosquito, an operation looked upon as the acme of finesse, a technique almost necessitating the use of an expensive dissecting microscope, the taking up of considerable time,* and the waste of a proportion of the mosquitoes being examined.

Neither Ross's wonderful discovery that the sporozoites burst their way out of the oöcysts into the hæmocœle, the "body-cavity," of the mosquito, and find their way into the salivary glands, nor the results of the researches by Mayer (1921) and Mühlens (1921) who noted that all the organs of the body except the ovaries, and particularly the musculature of the palps and scutellum, become crammed with the parasites, have been of any practical value until recently.

Lately, however, a method, based on the realisation of the facts and elaborated by Drs. Edmond and Etienne Sergent, has been brought to our notice by Professor Dr. Schüffner while touring India with the Malaria Commission of the League of Nations, and in response to our request Dr. Edmond Sergent has since given us the following information concerning the method.—

"Je vous adresse ci-joint des indications sur notre technique pour la recherche rapide et commode des sporozoites dans le corps des Anophèles.

Dissection des glandes salivaires d'un anophèle. On commence par enlever les pattes et les ailes de l'anophèle; puis, le thorax étant fixé par une épingle, on saisit avec une pince fine la tête du moustique et on l'arrache. On voit deux petites gouttelettes brilliantes à la partie postérieure de la tête arrachée: ce sont les glandes salivaires de l'anophèle; il suffit d'en faire un frottis sur une lame porte-objet, ou l'on recherchera les sporozoïtes. Si les glandes salivaires ne restent pas du côte de la tête, saisi le thorax avec une pince: à la pression, une gouttelette formée de liquide et de tissus thoraciques broyés fait hernie du côté

* One of us has dissected and examined an average of 40 mosquitoes *per diem.*

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du cou. Faire un frottis figurant une ligne quelconque (en forme d'S ou de Z, par exemple) pour permettre d'explorer facilement toute la préparation avec l'objectif à immersion, ce que l'on n'obtiendrait pas si le frottis formait une tache."

He also kindly sent us a copy of their "*Vingt-cing années d'étude et de prophylaxie du paludisme en Algérie*" (1928) in which a figure supplements the recommended technique. This figure is here reproduced (Fig. 1).

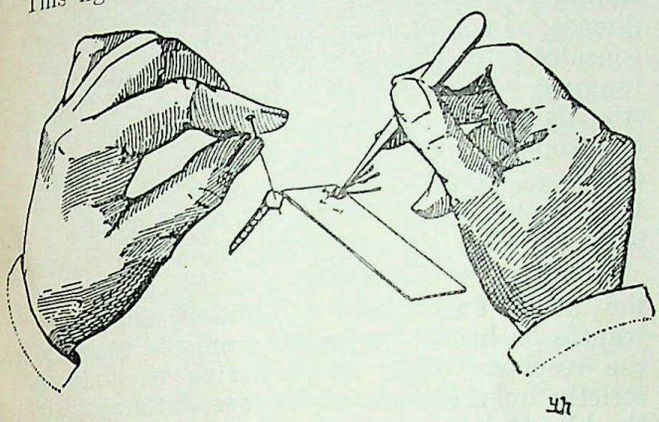


Fig. 1.—(After Sergent and Sergent).

We now give in this paper the results of our tests of the method or rather of the principle underlying it, and we have the honour, in view of the circumstances related above, to name it "the Sergents' method."

In the first instance we have followed literally the technique as advised with but slight modification. After the evulsion of the legs and the wings, the mosquito is placed on a glass slide and the head decapitated by a sharp-edged needle. A blunt needle is then placed across the thorax, and gentle pressure is applied, so that some "body fluid" exudes through the cut end of the neck into a minute drop of normal saline, previously placed upon the slide: the smaller the drop of saline into which the hæmocœlic fluid escapes, the more quickly one finds the sporozoites, for a smaller area has to be searched. A cover-glass is then applied and the preparation examined under a 1/6th inch objective with a No. 8 ocular.

We have confirmed all our findings with the oil immersion objective although this would not be necessary for routine as the sporozoites measure about 14 μ long, and in fresh specimens look either straight, a little curved, sickle or S-shaped, and are feebly motile (Fig. 2).

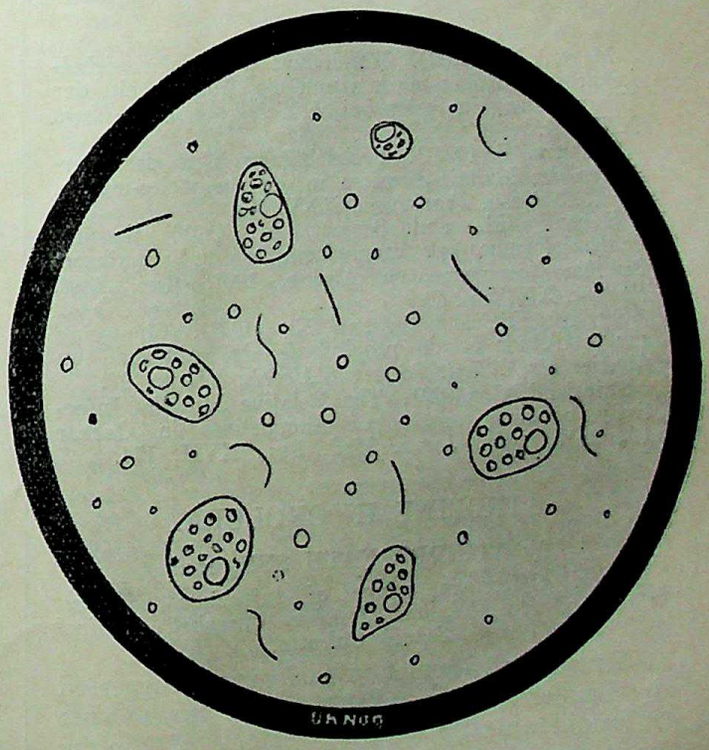
Subsequently we have tried the technique of pulling off the coxæ of the legs and pressing the body-juice out through the rent caused in the body wall. But the former method is the more convenient.

In all our mosquitoes we first of all looked for the sporozoites by the above method, and then, whether we had found them or not, we dissected out the salivary glands, in order to compare this method with the standard method of looking for the parasites. *In no case, when the salivary glands were found infected, had we not already observed the sporozoites in the hæmocœlic fluid.* On the other hand in no case in which we had found the hæmocœlic fluid infected did we find sporozoites absent from the salivary glands.

We used *Anopheles stephensi;* out of a total of 78 fed (on different occasions) on gametocyte-carriers sporozoites were detected in 57, and in 21 they were not found, and as already stated the examination of the salivary glands in no case reversed the finding.

As a control we dissected a dozen mosquitoes bred out from the same batches that we had used for purposes of infection and in no case did we find the sporozoite-like bodies.

The method technically then is 100 per cent. efficacious, and it has moreover many advantages over the standard method. In the first place, the skilful worker at dissection can be dispensed with, one might even say that every stage except the examination of the preparation under the microscope could be carried out by a menial servant, while a laboratory assistant could be taught to look for the parasites under the 1/6th inch objective. Secondly, the technique can be carried out under the naked eye, no expensive dissecting microscope being necessary. Thirdly, the loss of a proportion of the mosquitoes being examined, or rather



× 600.

Fig. 2.—(Eyepiece 6 ×, Objective Oil Imm. 1|12).

the failure to dissect out their glands, is obviated, because if the parasites are in the mosquito they will be found in 100 per cent. of them by the new method. Fourthly, there is the gain of much greater rapidity.

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Regarding the last point we have made 24 negative preparations in one hour without the operator having any assistance, the whole technique as described above being carried out by one of ourselves. This is equivalent to the examination of about 200 mosquitoes by one man per diem. This may be compared with the 40 mosquitoes per diem examined by dissection of the salivary glands (*vide supra*). If, however, the more mechanical items of the technique be carried out by assistants sitting beside one, greater efficiency and a diminution of expenditure ought to result.

So much for sporozoite-negative specimens. Positive specimens would lead to even greater rapidity as one can see at a glance if infection be present.

If one appreciates the desirability of examining the sporozoite-rate as a routine measure when investigating the malariology of a locality, the Sergents' method is the most efficacious. Taking for the moment the examination of 100,000 mosquitoes as an advisable number for providing reliable infectivity rates of the species—one of us (C. S.) has already shown that even as few as 10,000 is apparently sufficient to submerge the errors of random sampling—the cost of an establishment for that purpose should be very small in view of our experience of the efficacy of the Sergents' method.

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ATROPINE IN CHOLERA.

By ATINDRA NATH SEN, M.B.,

Medical Officer in charge of Infectious Diseases, Campbell Hospital, and Teacher, Campbell Medical School, Calcutta.

THE use of atropine in cholera was suggested by Lauder Brunton in 1894 on the ground that it would antagonise the symptoms of cholera as it does those of muscarine poisoning. Muscarine is an alkaloid of unknown chemical composition derived from the poisonous mushroom *Amanita muscarina*. In muscarine poisoning there is profuse secretion of saliva and tears, nausea, vomiting, pain in the abdomen, and violent movements of the intestines with profuse watery evacuations. The seat of action of muscarine is the myoneural junction (Cushny).

The action of atropine is just the reverse as it is found to paralyse the myoneural connections. The involuntary unstriped muscle fibres of the stomach, intestines, etc., but not those of the arterial walls are affected in this paralysis.

Sir Leonard Rogers was the first to try atropine in cholera and he recommended its routine use from the earliest stages of the disease. In the acute condition we have to consider three classes of patients (1) those who improve without the use of atropine, (2) those who show improvement from the administration of atropine, (3) those who get worse in spite of atropine. Hence the point is to select the cases that would be benefited by atropine and to expunge those who would be made worse by it.

In all cases of cholera with loss of fluid in the acute stages the amount of fluid to be transfused has to be judged from the nature of the response while administering it, and not strictly on the basis of the specific gravity of the blood alone. In many cases I have noticed an entire absence of response after transfusion of fluids. I mean, the pulse did not become perceptible or, if it did, it was very feeble, dwindling to nothing in less than an hour. The transfusion did not maintain the blood pressure owing to loss of tone in the peripheral arterioles—very rarely to cardiac asthenia. If the loss of tone in the musculature of the peripheral arterioles is alone the cause, then in my experience the administration of adrenalin chloride fails to improve the pulse. It seemed to me that the function of the nervous mechanism was disordered. I have found that these patients often develop tympanitis, slight or great, from the acute stage of collapse, or within 2 or 3 hours after transfusion. The movements of the intestines cannot be seen at all and the intestines appear in the extreme cases as if they were paralysed. If there was tympanitis in the acute stage before transfusion, a complication usually augmented by the transfusion, or if there was a tendency to tympanitis as a result of transfusion, I invariably found that the tympanitis was doubly enhanced if atropine were given, the patient very often going downhill rapidly. With the management in these cases I hope to deal in a subsequent paper.

Again, with improved circulation after transfusion and probably from greater absorption of toxins from the bowels, the temperature invariably rises. It is a known fact that atropine does cause a rise of temperature and in the susceptibles in cholera cases, I noticed that a small dose of even 1/100 grain was enough to cause a definite rise. Moreover there are cases, whether with or without loss of fluid, who show a high rise of temperature with a tendency

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to maintain it day by day, beyond the usual reaction time of transfusions. These are just the cases who develop hyperpyrexia if atropine is given; I have noticed this effect in many cases.

Lastly, there are cases of cholera in which transfusion has to be abandoned owing to acute precordial distress. The percentage of these cases is very small, not more than 0.5 per cent. These cases should be treated on different lines but atropine has been found useful in them in combination with other methods of treatment.

So I always watch my cases for signs of (1) tympanitis, and (2) hyperpyrexia, for the first 24 hours before administering atropine. A systematic use of atropine from the beginning without studying the cases from the onset causes a mortality which could be reduced by a judicious selection. If there is repeated collapse beyond that temporary recovery after transfusion, with no tendency to rise of temperature, if there is no excretion of urine after 24 hours, if the respiratory rate assumes the rapid or heavy type (one of the early indications of uræmia), atropine is always indicated. I have not been able, however, to observe an actual increase in the amount of urine as a result of the administration of atropine.

A Mirror of Hospital Practice.

NOTES ON ORIENTAL SORE.

By A. BAYLEY DE CASTRO,
CAPTAIN, I.M.D.,
Military Families' Hospital, Hyderabad (Sind).

ONE hundred and forty-eight cases of oriental sore (cutaneous leishmaniasis) were reported in the medical records of the British Army for 1929. The following note on the treatment of two cases may therefore be of interest.

Mrs. B., the wife of a quartermaster-sergeant, consulted me on the morning of the 22nd February, 1931, in connection with "a rash on the hands." All the history she could give me was that three weeks previously "a small red irritable lump" had appeared on the back of each hand. She scratched it and later the backs of the hands became red and painful; as the use of Iodex had done no good she came to see me.

Condition when first seen.—The dorsum of each hand presented a dull, congested, and inflamed appearance, with several papules and pustules scattered about. The area involved extended from the metacarpo-phalangeal joint of the forefinger to that of the ring finger, and downwards as far as the level of the carpo-metacarpal line or, roughly speaking, practically the whole of the dorsal surface of the hands was involved. The left hand lesion presented a remarkably honeycombed appearance when cleaned, and the pustular openings showed up. Scrapings and "juice" examined from this lesion showed a heavy infection with *Leishmania tropica*, some free, but the majority in the endothelial cells, while numerous clumps of staphylococci were scattered about indicating a secondary infection. In addition to the lesions on the hands, I discovered one on each forearm and one on the right upper arm. These lesions were what one could call "pure," i.e., no secondary infection had supervened, and they furthermore presented the typical picture of an oriental sore before it breaks down. Thus, each of these superficial ulcerated lesions was about an inch to 1½ inches in diameter.

The margins were hard, raised, and indurated, with a congested discoloration spreading out into the surrounding skin from a quarter to half an inch all round. The central portion presented several papules, very friable and moderately painful and sensitive.

There was no lymphatic glandular enlargement. The patient had no idea of the order in which these several lesions appeared nor could she remember any constitutional disturbance. She was a healthy, well-developed woman of 33 years. At this time of the year sand-flies are not very common in Hyderabad (Sind) but a few are always present all the year round.

She distinctly remembers being "bitten by something on the hands." No scraping or juice examination was done from the right hand and right upper arm, but from the other three lesions (right and left forearms and left hand) microscopic examination revealed innumerable *Leishmania tropica*.

Treatment and progress.—The wounds were well cleaned with normal saline compresses and then a 2 per cent. sodium antimony tartrate ointment was applied, but as this caused a lot of irritation and pain the strength was reduced to 1 per cent. Into the sores on the forearms was also infiltrated ¼ grain emetine hydrochloride in 1 c.c. distilled water.

On examination three days later there was no marked change in any of the ulcers and in fact one of them (left forearm) appeared to have been irritated very much. The antimony and emetine treatment was, therefore, stopped, and I started on berberine sulphate. The strength used was ¼ gr. to 1 c.c. and this quantity was infiltrated into the lesions on the forearms, not forgetting the raised indurated margin, the wound first being cleaned with hydrogen peroxide and a double strength saline compress. The lesions on the hands and upper right arm were treated with saline compresses only.

In three days' time there was so great a change in the two ulcers treated with the berberine sulphate that the patient herself asked for this treatment on the hands. Scrapings examined from the two lesions on the forearms were negative to *Leishmania tropica*. The lesions on the two hands and the right upper arm were infiltrated with 2 c.c. of berberine sulphate solution. This injection caused a burning sensation which lasted four hours. The forearm lesions were thickly spread with boric powder.

In a week's time the change in the condition of all the lesions was most striking. There was practically only a discoloration of the skin left. The right hand alone showed a certain amount of moisture and inflammation and this disappeared in another two days.

Before concluding I must also mention another patient I had at the same time. This was a boy, 9 years of age, the son of an Indian officer of the Second Divisional Ammunition Column, Royal Artillery; he had recently arrived from Rawalpindi. He was infected on the right cheek and over the zygoma there was a circular, superficial ulcer with a raised and hard margin, about the size of an eight anna piece. The ulcer had a crust over it which, when removed, showed an unhealthy granular surface with half a dozen openings. Scrapings examined microscopically showed the protozoal parasites *Leishmania tropica* in the endothelial cells and also innumerable clumps of staphylococci.

On 6th March, 1931, I infiltrated this sore with 3 c.c. of 1 per cent. berberine sulphate solution. On the 12th March all signs of an inflammatory process had gone and a small superficial healthy granulating surface was all that was present. Scrapings on this day were negative to *Leishmania tropica*.

The sore was liberally treated with boric powder and finally all that was visible on the 14th March, 1931, was discoloration of the skin.

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Remarks.—I have so far treated in all nine patients for oriental sore, and have found the results obtained with berberine sulphate solution infiltration most favourable. The infiltration of the whole affected area, not forgetting the margins, must be done very thoroughly, and for this reason 1 c.c. of the solution is not sufficient.

In the December 1930 issue of the *Indian Medical Gazette* there is a very informative article on this same subject. The writer advocates a 3 c.c. infiltration of a 2 per cent. solution of berberine sulphate. Although I agree with the quantity he recommends, I am not in favour of a 2 per cent. solution being the recognised standard, for the simple reason that some patients complain of a severe burning sensation for many hours, and in such cases, if there were several sores to be injected in rotation, they would in all probability object to the treatment. On the other hand in some robust male patients I would not hesitate to use a 2 per cent. solution. If, however, 3 c.c. of a 1 per cent. solution brings about a cure without causing any inconvenience, is it necessary to increase the strength? In the case of a supervening pyogenic infection, the ulcer should be thoroughly cleaned with hydrogen peroxide and after the injection it should be thickly covered with boracic powder; the whole is then covered with sterile gauze and bandaged up for four days. I have never found any constitutional disturbance in any of my patients.

QUININE URETHANE IN A CASE OF HYDROCOELE.

By K. VENKAT RAO,
Purasawalkam Vepery, Madras.

ON September 23rd, 1930, a man, aged 25, came to me to have his hydrocoele tapped, as he was afraid of operation. The hydrocoele, which was of a fairly big size and tense, measured 8 inches in length and 4 inches in diameter. It was of six months' duration.

With due aseptic precautions, it was tapped by means of a trocar and cannula and after the thin clear serous fluid was completely removed 2 c.c. of quinine urethane (P. D. & Co.) was introduced into the sac through the cannula by means of a 2 c.c. syringe. The cannula now being withdrawn, the fluid injected was driven to all the parts of the cavity by gentle massage.

After a week, the swelling had regained its original size and the fluid, which was clear, was removed. A week later when the patient saw me the hydrocoele had again attained three-quarters the original size.

This time, the fluid was withdrawn and another 2 c.c. of quinine urethane injected and he was advised to come to me after a week.

Now, when he came, hydrocoele fluid had collected to nearly half the original size. This fluid was withdrawn and from that day no further fluid has collected.

Remarks.—Knowing, as we do, the action of quinine urethane on the blood vessels, the non-recurrence of fluid might be due to the obliteration of the vessels that line the cavity of the tunica vaginalis. How far the treatment is successful and beneficial cannot be definitely stated, as the treatment was carried out in only one case. Yet this treatment is worth trying, especially in those who are nervous of operations for radical cure, in those who are unable to abstain from their bread-earning work, and in those who cannot stand an anæsthetic, either on account of advanced age or other conditions in which general anæsthesia is contra-indicated.

A CASE OF HEMIPLEGIA COMPLICATING TYPHOID FEVER.

By S. K. SUNDARAM, B.A., M.D.,
Headquarters Hospital, Tanjore.

HEMIPLEGIA is one of the rare complications of typhoid fever. Osler and McCrae in their "Modern Medicine," 3rd edition, do not give any actual figures. Tice, in his "Practice of Medicine," quotes 42 cases collected by Smithies of which six were fatal. Whatever the actual number of cases, cerebral lesions complicating typhoid are sufficiently uncommon to call for note.

A girl of fourteen years was admitted in a low and practically unconscious state on 13th November, 1930, to the medical wards of the District Headquarters Hospital, Tanjore. The only available history was of fifteen days continuous fever, starting after headache; the bowels were irregular. Five days prior to admission, when the patient was at stool she fainted and fell down, and it was noticed too that she had become paralytic on the right side of the body and face. She could not talk at first, later on she began to express her elementary wants.

On examination, the patient was found to be in a very low state. There was right-sided hemiplegia with paralysis of the face on the same side. The limbs were quite flaccid. On the right side the knee jerks were exaggerated. Babinski's sign was positive. Arm jerks and abdominal reflexes were absent. Reflexes were normal on the left side. Sensory changes could not be elicited, as the patient did not respond to questions. She would just put out her tongue, but could not talk. There were no cardiac murmurs.

On the day after admission, 14th November, 1930, the right leg and right arm began to get stiff. The right arm jerks were exaggerated.

On 15th November, 1930, the patient was taken home and is reported to have died soon afterwards.

Blood was sent for the Widal reaction on 14th November, 1930, and the report of the King Institute was:—

B. typhosus—Positive, 1 in 200.
B. paratyphosus A—Negative, 1 in 25.
B. paratyphosus B and C—Positive, 1 in 50.

There were no parasites in the blood smear. The urine contained a slight trace of albumin.

It is of interest to note that in two-thirds of the cases collected by Smithies the paralysis was right-sided with aphasia. Without autopsy one can only guess at the character of the causative lesion; hæmorrhage, thrombosis, embolism, meningo-encephalitis, very rarely meningeal hæmorrhage, have been reported. Tice remarks that from post-mortem records thrombosis appears to be the commonest lesion.

I am indebted to Lieut.-Col. A. P. G. Lorimer, I.M.S., the Superintendent of the Hospital, for his kind permission and encouragement to publish these notes.

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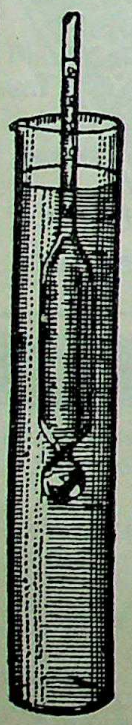

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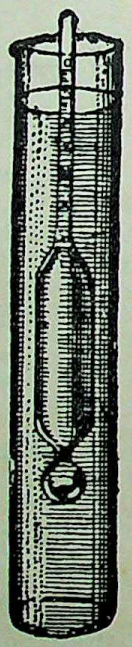

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Indian Medical Gazette.

JULY.

THE TREATMENT OF ORIENTAL SORE.

INTRAVENOUS antimony therapy for the treatment of leishmania infections was introduced in 1913 by two South American workers; it was used by them in the muco-cutaneous form of leishmaniasis which is caused by *Leishmania brasiliensis*, a protozoal parasite of the same genus as the causative organisms of kala-azar and oriental sore. Two years later it was used in Italy and immediately afterwards in India in the treatment of kala-azar. Tartar emetic was the first antimony preparation employed, and during the next ten years a succession of new antimony compounds was introduced. The story, with which most of our readers must be familiar as nearly every step forward was first announced in these columns—of how the death rate in this previously fatal disease has been reduced to 5 per cent. or even less, and how the treatment, at first a long-drawn-out process which necessitated a stay in hospital of many months, can now be accomplished within a week—forms one of the most encouraging chapters in the history of specific therapy. The subsequent brilliant success of the antimony treatment of kala-azar has overshadowed its prior success in the treatment of the much-less-serious cutaneous lesions. It has been assumed, except by those who have had to treat oriental sore, that, *pari passu* with the improvement in the treatment of the more serious general infection, there has been an improvement in the treatment of the local condition. We have seen it stated—though by theorists with no practical experience—that if a given number of injections will cure the generalised infection then probably less than half or a third that number should be sufficient to cause an ulcer to heal up. Unfortunately, in actual practice, this has not turned out to be the case; in fact there are indications that the pentavalent compounds of antimony which are so successful in the treatment of kala-azar are less efficacious than the antimony tartrates in the treatment of oriental sore.

The various forms of treatment used might be divided into general and local; amongst the former are salvarsan, which achieved very little success, and potassium and sodium antimony tartrates; the first reports on these were very good and suggested that at the most 10 injections might be relied upon to produce a cure, but for some reason or other this form of treatment is not favoured in centres where the disease is prevalent. Next came the pentavalent compounds of antimony; cases of remarkably rapid cure were reported with such compounds as Stibosan and Neostibosan, but no proper series of cases has been reported, and from various sources we have heard of disappointing results being obtained; at the Calcutta School of Tropical Medicine, where we get comparatively few cases, we have not had uniformly successful results with Neostibosan. We have also tried the newer trivalent compounds of antimony, such as Antimosan for intravenous injection and Fouadin for intramuscular, with only moderate success.

There have been an enormous number of local "specifics"; we need only mention the more important. The reports on the results of *x*-ray treatment, diathermy and ionization have been mixed; the first has been the most successful, but in any case they are all put out of court for the masses in this country on account of the expense. Infiltration of the sore and the immediately-surrounding area with a solution of emetine was an apparently successful form of treatment which seems to have fallen into disfavour recently. On the other hand the application of carbon dioxide snow, which is a conspicuously successful treatment in single, comparatively early lesions, is still used very extensively in hospital practice; for the doctor who only has one or two cases a year there are obvious disadvantages in this method, though where larger numbers have to be treated it is not expensive. Tartar emetic ointment has been advocated, and for it successes have been claimed; but it usually gives rise to a severe local reaction and for this reason it is unlikely to become popular. The action is probably not specific.

Of all the forms of local treatment advocated, undoubtedly the most successful is berberine sulphate; a 1 or 2 per cent. solution of the acid salt is injected into the sore and the surrounding area. Complete infiltration of the infected tissue is aimed at; consequently, for each sore a number of injections are required. After one thorough infiltration it is usually difficult to find the parasite, and after the second they will have disappeared in almost every instance. The injection does not cause necrosis, but frequently it causes a fairly sharp inflammatory reaction, and for this reason we prefer to give the treatment at weekly intervals, instead of at the shorter intervals advocated by some writers. Though the parasites seem to disappear after one or two applications, it has not been our experience that ulcers, even those in which there is little secondary infection, then heal immediately, and we have often found, contrary to the published accounts of this treatment, that at least five applications are necessary. A great advantage of this treatment is that it is extremely simple; all that is required is the solution and a hypodermic syringe. A tuberculin syringe is preferable,

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but any syringe with a fine, well-fitting needle and a well-fitting barrel will do. No clumsy apparatus is required, as in the case of carbon dioxide snow. This form of treatment has, however, its limitations. In the first place it is far from painless. We have observed that the ability of the physician to bear pain—in his patient—varies considerably; some inflict, even the severest pain, bravely, whereas others, of a more sympathetic nature, are sensitive to the least discomfort that they cause. However, this is a matter in which the patient has the last word, and, however stoical physicians may be, no treatment that is very painful will ever become popular. In cases in which there is a single early lesion that can be completely indurated by 3 or 4 punctures and perhaps cured by two applications, the patient will not usually complain, but in cases in which the lesions are multiple and advanced, where the 5 punctures for each sore have to be multiplied by, say, 10, the number of ulcers, and again by perhaps 5, the average number of applications, it is obvious that this form of treatment is almost out of the question.

In this connection there are two points which require investigation; the first is the total dose of berberine sulphate which a patient will stand without showing any toxic symptoms, and the second is the possibility of the prior application of one of the new anæsthetics, such as Percain, to the ulcer for a few minutes before beginning the injections. Up to the present most observers have assumed that about 3 c.cms. is the maximum which it is safe to administer; this is only sufficient to infiltrate two ulcers at the very most, so that when there are more than this the others have to be done on another day.

Our discussion is confined to the *specific* treatment of oriental sore. But in all cases in which there is open ulceration there is certain to be secondary infection; this will have to be dealt with *pari passu* with the specific treatment by means of mild antiseptic dressings or hot fomentations as the occasion demands, and when the specific element is eradicated it may even be necessary to resort to surgical measures.

The literature on the treatment of oriental sore is not in a very satisfactory state; theoretical considerations and analogy with the treatment of kala-azar have been given undue prominence in textbooks, whereas articles in medical papers have mainly been reports on a few cases in which one or other of the treatments advocated has been particularly successful; the diagnosis is frequently clinical and failures are not reported. To this generalisation there are of course exceptions. A contributor from Lahore has recently sent us a paper reporting his experience in the treatment of oriental sore. His paper is included in this number of the *Gazette*. The majority of the cases on which he has reported were of single sores and for these he advocates local treatment exclusively. The results he has obtained with berberine sulphate have been extremely satisfactory, but the fact that 18 out of 23 ulcers took 3 weeks, or more, to heal up shows that the *magical* effects which have sometimes been claimed for this drug cannot always be guaranteed. In Calcutta oriental sores are comparatively rare, as the infection is not acquired in Bengal, so that we cannot hope to report on the treatment in any considerable series of cases, but, in many places in northern India where the disease is endemic, the clinical material must be abundant and it is disappointing that satisfactory reports, such as the one to which we have just referred, are not available. It is quite obvious, we think, that of local treatments berberine sulphate is the drug of choice, but there still appears to be a little doubt about whether a 1 or a 2 per cent. solution should be used. The writer referred to above recommends a 2 per cent. solution whereas another contributor, from Sind, considers that this is too painful for ordinary use and recommends a 1 per cent. solution. The latter percentage has obvious advantages if it is equally efficacious. This is another point which requires investigation. Furthermore, there are certain cases, especially those in which there are multiple sores, in which general treatment in the form of intravenous (or intramuscular) injections of some antimony preparation would be more suitable than the local treatment. It is by no means clear which group of compounds, the pentavalent or the trivalent, gives the best results; and after this point has been settled there are then a number of compounds of each group to be tested. Our Lahore contributor used Urea-Stibol without much success; but the dosage was so totally inadequate that it is surprising that there was improvement in any of his cases. It is not at all unnatural that he should make such a mistake in view of the very unsatisfactory state of the literature on this subject; the total dose he gave was 0.7 gramme spread over a period of 29 days, whereas our routine treatment for kala-azar, a disease in which general debility is a marked symptom, is a total dose of 2.7 grammes of Neostibosan—another pentavalent compound with a higher percentage of antimony than Urea-Stibol—in 6 days. We do not suggest that such concentration of treatment is necessary or even advisable in oriental sore, but, unless a total dose of at least the amount usually given in the case of kala-azar is given, it will be unfair to draw conclusions regarding the efficacy of any drug in the treatment of the cutaneous disease.

MATHEMATICS AND MEDICAL RESEARCH.

OF all men who have at any time come under the heading of scientists surely the average

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medical man is the most unscientific. Despite the fact that he obtains so much assistance from the exact sciences he still persists in being an artist. He says, "In my experience such-and-such a drug gives better results," which does not mean that he has treated a hundred patients with that particular drug and a hundred with some other drug and found out which gives the better results. It means that he has a vague impression, brought about by all sorts of influences totally unconnected with the drug itself, that his results were satisfactory. If he looked up his notes of the cases in which he used the drug, he might quite possibly be horrified at finding how wrong his impression had been.

He will, naturally and rightly, defend himself from this unprovoked attack. "Would you have me a machine that simply notes down signs and symptoms and then with the aid of pencil, paper and a logarithm table works out a diagnosis, and just because you, or some of your fellow pseudo-scientists, have decided that "A" will produce a 95 per cent. cure rate against "B's" 85 per cent., am I to be compelled to use the former? Is my knowledge of the constitution of the patient, whose father I treated and whose grandfather I knew, to go for nothing?" He will say all this and a great deal more, and he will obtain much support in favour of his point of view. Yet medicine *is* a science; it is built up on observations scientifically made of the frequency of occurrence of certain events and their correlation with other events.

The medical student is not usually worried much by his examiners on the subject of biometry and statistics, so that when his lecturers touch on the subject he frequently finds something else to think about. If his life is spent in the practice of clinical medicine, his very limited knowledge of mathematics and statistical methods will probably not prevent him from being a successful practitioner, and the various advances which are made in clinical medicine with the aid of statistical methods will be presented to him in such a way in his textbooks and clinical journals that he will not realise the importance of the part played in these advances by the subject he has always cold-shouldered; so his dislike—which is really a primitive fear of the unknown—continues throughout his life. If, on the contrary, fate leads him into other channels, such as public health and medical research, he will have to overcome his repugnance or he can never hope to be successful. At every turn the research worker will find that he is hampered by his limited knowledge of mathematics and unless he has a mathematical "sense" and a groundwork of mathematical knowledge he cannot expect to make much progress. Medical research of the present day, in India at any rate, is very greatly hampered by this lack of mathematical knowledge amongst workers. This is to a certain extent the fault of the workers themselves, but it is also the fault of the expert biometricians. Even the medical men who make a special study of mathematics, with very few exceptions, appear to go over to the other camp; they tend to assume the cloak of the pure mathematician rather than that of the practical biometrician, so that they become incapable of seeing the problem of the medical research worker from his point of view, and their own publications become entirely incomprehensible to the average medical man. The expert biometrician will not come down to the level of the moderately intelligent research worker and the average research worker does not possess the ground knowledge, nor has he the time to acquire it, which is essential for his elevation to the heights on which the biometrician is prepared to meet him. When appealing to mathematicians for assistance we have from time to time received some very valuable help, usually in the form of criticism, but often the replies have been entirely incomprehensible, both to us and to our colleagues, and on one occasion for a cure-rate curve we were given a formula which proved that the more the treatment the less were the patient's chances of recovery; as this was entirely contrary to our own interpretation of our clinical experience, we were naturally discouraged.

Between the higher mathematician and the rest of mankind a great gulf is fixed. For every nine hundred and ninety-nine persons who have no interest in what is occurring on the other side, probably only one has a feeling that something of value to his work might be obtained from across this gulf. Amongst those forming this small minority are certain medical research workers; for their benefit, and for that of others, the biometrician has come forward and has attempted to bridge the gulf. This he has done successfully as far as he himself is concerned. Our complaint is that he has left a series of gaps in the bridge; these *he* can jump over quite easily, but this is not the case with others; some find themselves in trouble at every gap and few can negotiate them all; even these do it with great difficulty.

A better liaison between the mathematician on the one hand, and the clinician or research worker on the other is obviously desirable, but how is it to be brought about? It must clearly be tackled from two points of view. The mathematical standard of the medical research worker must be raised but at the same time the mathematician must descend from his splendid isolation and help the struggler on his way. This can be done in a number of ways, by raising the mathematical standard for qualifying as a medical student, by introducing mathematics into the medical curriculum, or by post-graduate teaching. Leaving

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out the second suggestion as being an inadvisable measure in view of the existing congestion in the medical curriculum, it is obvious that suitable post-graduate courses in mathematics are the only solution, because even if a boy receives a sound mathematical education it is surprising how much he has forgotten by the time he has taken his medical degrees. The course for the Diploma of Public Health includes lectures on epidemiology and vital statistics, but this is insufficient for the medical research worker; furthermore, this course of instruction is by no means an essential part of the medical research worker's training. Assistance may be obtained from books. A number have been written especially for the sanitarian and the medical research worker, but in our experience they all make the same mistake—they under-rate the reader's common sense and they over-rate his mathematical knowledge. To us, reading one of these books is very like interviewing an inmate of a lunatic asylum; you listen to the patient's perfectly reasonable arguments and find yourself thinking, "There must be something wrong here; it is very unfair that this man should be kept in an asylum," when you suddenly realise that he has made some preposterous assumption, that he is Napoleon Bonaparte, for example, and that he is now talking irrational rubbish. So with books on medical biometry, one starts reading a chapter and is struck by the writer's clear exposition of the subject and the sweet common sense of his arguments, when he suddenly introduces a complicated equation—apparently from nowhere—after which one might just as well shut up the book. Although we know of no book which we can absolve entirely from exhibiting the defects we have mentioned above, Professor Raymond Pearl's *Medical Biometry and Statistics*,* of which the second edition has just been published, can be said to contain the maximum of clear reasoning and the minimum of Napoleon Bonaparte. Amongst those which contain little but the former commodity we must include the chapters on tabular representation of statistical data, on rates and ratios and on life tables; in this last-named chapter he has taken for his life curves such diverse subjects as the starved *Drosophila melanogaster* male, whose mean duration of life is apparently 44.09 hours, and the automobile which has a mean duration of life of 7.04 years. But the last chapter, on the logistic curve, entirely on account of our very defective mathematical education, we must place in the "Napoleonic" class. From the point of view of both the sanitarian and the medical research worker it is a book which we can thoroughly recommend.

* *Medical Biometry and Statistics.* By Professor Raymond Pearl. Second Edition (revised and enlarged). Philadelphia and London: W. B. Saunders Company, 1930. Pp. 459. Illustrated. Price, 25*s.* net.

In the new Rockefeller All-India Institute of Hygiene which is to be opened in Calcutta at the beginning of next year there is to be a chair of Epidemiology and Vital Statistics. The suitable filling of this post will be an extremely difficult task; if the right man is obtained he should be able to give invaluable aid to the research workers in Calcutta as well as in other parts of India.

Special Article.

NOTES ON A VISIT TO BANGKOK AND SIAM.

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THE eighth F. E. A. T. M. Congress at Bangkok was a distinct success. Our visit to Siam was instructive and pleasant. Its value was naturally not confined to our meetings at the scientific sessions of the Congress. We had the opportunity of meeting fellow workers from all over the Far East; there were occasions for meeting at hotels, excursions, and social functions; at these one met practically everyone at the Congress, and talked of and discussed malaria, leprosy, cholera, health administration and methods, and a hundred other things of mutual interest. This was valuable, but not particularly related to the venue of the Congress in Siam. Siam was an unknown country to most of the delegates and to be able to meet the administrators of this kingdom, its doctors and public health officers, its students and people, to learn of things at first hand, to discuss activities of medicine and public health, possibilities and probabilities, difficulties and solutions, to see actual conditions, attempts, and accomplishments in public health—these were unique things which both taught and entertained, and I hope broadened one's knowledge and outlook. One met, for instance, Prince Sakol, Director-General of Public Health, a man of wide travel and wide knowledge of public health administrative methods all over the world. One heard from him his ideas and ideals of Siam's medical and health problems, of how those should be tackled; one saw what had been done and what was intended in the future. I called on the Director-General of the Department of Municipal Affairs, a gentleman also of wide experience in Siam and especially of Bangkok, and so on in the matter of medical education, hospital administration, water supplies, field sanitary work, etc., etc. One made it one's duty to meet as many of Siam's administrative and executive officers as one could in the time. It would be impossible to record experiences and offer opinions on everything one saw. I shall mention only a few that I myself found of particular interest.

Public health administration.—In probably the only absolute monarchy of the world, this question was bound to have an interesting aspect. Absolute monarchies in history have been both brilliantly successful and miserable failures, ideal only when there is a continued succession of able and enlightened rulers. In European history absolute monarchism has ended in revolution and tragedy, where it has not given way to democratic methods. In Siam at present the ruler is young, travelled, enlightened and imbibed with the highest ideas of responsibility and during his short reign a great deal on the most modern ideas of public health has been initiated. Public health and medical administration is of necessity largely centralised. The King is the supreme head of all administration in every

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department, though advised in important matters of policy by a Supreme Council. The chief department is that of the "Interior" and the Minister of the Interior is (second to the King) the highest state official. Under the Minister of the Interior are many departments, two of which are the Department of Public Health and the Department of Municipal Affairs, each presided over by a director. As a matter of fact these two departments are very largely concerned with the public health administration of the city of Bangkok. The city is directly administered by the Lord Prefect of the city, who is an official of the Ministry of the Interior. Indeed most of the public health work of the country is concentrated in the city. Organised public health work of the city of Bangkok dates from 1897, when a law was promulgated providing for a medical officer of health and a city engineer. The city of Bangkok is divided into inner and outer areas. The inner area is the city and is the part which is referred to above as being administered by the Lord Prefect. The outer areas are not part of the city and are administered like urban sanitary areas (*see* below).

The water supply of Bangkok is excellent; it is taken from the river about 30 miles up, collected in an old river bed for sedimentation and then brought to the water works which are situated just outside Bangkok. Here it is treated by rapid sand filtration of the Jewell type and distributed widely throughout the city by sand-pipes, etc. It is chlorinated by a Paterson chloronome, the amount of chlorine being carefully adapted to the minimal needs by the Paterson chloroscope. I was very impressed with the efficiency of the water works. To the excellent supply must be attributed the freedom from epidemic cholera, for Bangkok abounds in water canals or "klongs" which are used for communications, bathing and domestic necessities of all sorts.

The system of night-soil disposal is at present primitive; the larger houses and hotels, etc., have septic tanks and underground soakage channels. The bulk of the night-soil is removed and disposed in trenches and tanks; but a great deal of it I should say is not removed at all. Sullage drains of the main streets drain into the klongs, but off the main streets there is little or no drainage and pools of sullage collect under and round the houses and breed the millions of culex mosquitoes which are in Bangkok a veritable plague. General health work of the town is focused in the "Health Centres" of which there are now six. We visited several of these, and the work, though just begun, seems of an excellent type. These centres exercise general health and sanitary supervision over the districts of the city, special attention being paid to maternal and child welfare. The Bangkok Centre is new and is an up-to-date centre for the treatment and prevention of venereal disease which appears to be pretty widespread in Bangkok, and in Siam in general. We were informed in one of the papers read at the Congress that about 40 per cent. to 50 per cent. of the general patients of the hospitals of Bangkok give positive Wassermann reactions though a small proportion of these may be due to yaws. General moral laxity is ascribed as the cause, and not widespread prostitution. There are four notifiable diseases in Bangkok and Siam—plague, cholera, small-pox and cerebro-spinal meningitis. Plague is at present negligible; cholera is not endemic, but appears in epidemic form. There was a severe epidemic in 1927. Small-pox is well controlled, and vaccination and re-vaccination are compulsory at any time by order of the Ministry of the Interior.

Local self-government, therefore, does not find a place in the administration of Bangkok. Outside Bangkok, however, a distinct beginning has been made. In 1908 the Provincial Sanitary Organisation Law created Sanitary Boards in 27 towns and other communities. These boards have 5 official members and 4 headmen in the larger towns, in the smaller areas 3 official members and 2 headmen. The larger boards are presided over by the Governor of the district, the smaller by the District Officers. These Sanitary Boards are administered by the Department of Public Health under the Ministry of the Interior. The Sanitary Boards are charged with the maintenance of the cleanliness, vital statistics, and the prevention and treatment of disease. They have an income from "house tax" and from central revenues. A few have their own health officials, but most of the staff belong to and are appointed by the Department of Public Health. It is the intention of the Government of Siam that those boards should be the nuclei of municipalities which will gradually develop as local self-governing bodies on western lines. The large sparsely populated rural areas are largely untouched at present by any sanitary organisation. Registration of births and deaths, and notification of infectious diseases are done by "headmen" who report to the District Officer and police headquarters pretty much in the same way as the "chowkidar" does in India.

The Department of Public Health was formed in 1918 to supervise medical and public health services of the kingdom; taking over such medical functions as existed then from the Ministry of Local Government and the Medical Department. Its head is the Director who deals with the Minister of the Interior.

To advise the Director on health matters and policies, the Health Council was formed in 1928, and a Medical Council in 1923. The Medical Council is executive and deals with the registration of medical men of all classes—practitioners of the indigenous system as well as others, dentists, nurses, pharmacists, and masseurs. Except in the case of medical graduates, *periodical* renewal of licences to practise is required, such certificates being granted by the Ministry of Instruction. The medical law covering these rules is enforced at present only in the metropolitan area (Bangkok).

Medical education of a very high standard is provided at the Government Medical School at the Siriraj Hospital and graduates proceed to the M.D. degree of the Chulalongkorn University from here. The present high standard of organisation and medical education is due in a large measure to the Department of Education of the Rockefeller Foundation who have taken a very practical interest in the school, especially in recent years, and helped to provide teaching personnel for some of the sections. Up to a few years ago certificates of proficiency in medicine used to be granted, but now only degrees are given. The number of graduates already turned out amounts only to 34, and the number of entrants in the first year course this year is only 12. The higher standard required and the unattractiveness of the medical profession outside the city of Bangkok account for the paucity of under-graduates in the medical school. The Director of the Public Health Department (who is also President of the Medical Council) discussed the shortage of medical men in Siam in his interesting chapter in the official book presented to us—he outlines various alternatives to provide for a greater number of scientifically educated men by reviving the "Certificate" (on the terms, however, of the M.R.C.S., and L.R.C.P. standard and not on the sub-assistant surgeon standard), by making the state medical services more attractive, and providing a modified state course of preventive medicine only for the health services. The position is interesting and was discussed at one of the meetings of the hygiene section of the F. E. A. T. M. Congress. A physician of wide experience in Siam advocated the establishment of state hospitals at district centres with subsidised state medical officers of good qualifications, similar to what has been the rule in India. It is interesting to note this recommendation, as the position is being receded from in India in favour of the private practitioner element. The indigenous practitioner is, as stated, a very large class and is officially recognised by the medical law. They form a heterogeneous class with various claims to recognition from the "apprenticed healers" who follow tradition in their methods, "prescription healers" (with one or two specific prescriptions of a hereditary nature), "boil and wound

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healers," masseurs, healers by exercise, and ordinary quacks and imposters. Exactly what classes of these are given "certificates" and "licences" I was unable to find out, but the numbers given as registered in the metropolitan area were 631 in the "Modern art of healing" and 2,882 in the "Empirical art of healing."

There are some other activities of the public health services which have interesting points. The Rockefeller Foundation through its International Health Board has played an important part in the development of health activities. The Siamese Red Cross Society has been very closely involved in health progress. The Siamese Government approached the International Health Board in 1925 for co-operation in the propagation of health activities. Hookworm disease seemed a suitable subject for intensive work, and accordingly, under the general supervision of the International Health Board, a "Sanitary Campaign" was instituted; the health section of the Siamese Red Cross Society took over most of the activities, and to allow of greater flexibility than would be possible with a purely governmental control. After 3 years' successful instruction and work the school was retransferred to government control. Nine field units of the Health Department were formed for general work and 5 special units for hookworm. At Lobpuri an "Intensive unit" created a local health organisation and did a complete survey of health conditions. The idea was to make it serve as a model for other places. Every class of health work was done. I could get no report on this work as it had not yet been completed. The other units were a Health Board unit, educational unit, sanitary unit, etc. All sides of public health work have been dealt with during the campaign. The "campaign" is now at an end. Apart from its *ad hoc* sanitary work throughout the country it has provided the basis for the various branches of the Department of Public Health, for most of its units have become the various divisions of the Department. The Divisions of Health Education and Epidemiology were formed out of its personnel while the Health Divisions absorbed 4 of the remaining units. The Educational Division gives courses of instruction to sanitary personnel, to doctors and sanitary inspectors. The various Sanitary Board staffs are trained, appointed and administered by the Central Department of Public Health. The Health Division of the Public Health Department is concerned with publicity work; it maintains a library of health publications, and issues posters and pamphlets throughout the country through the medium of Health Centres and Sanitary Boards.

The above description is simply an outline of the public health administration to indicate how it was built up, its present system, and its probable line of expansion. Much is at present centralised but that Prince Sakol, the present Director-General of Public Health, has a thorough grasp of the meanings, the advantages, and disadvantages of centralisation and decentralisation will be evident from the following quotation taken from his article:—

"It is not conducive to the interest of the nation to concentrate all administrative authority in a single centre. The gains from centralisation may be great, but to obviate the evils that accompany it, a wise decentralisation is also requisite. Having secured political unity, it becomes the task of every statesman so to distribute the functions of government as to obtain the best political and financial results. The earlier historical movement that led to combination needs to be supplemented and corrected by the rational process of division of duties. The application of this universal truth to the present state of public health and medical service in Siam is more than obvious."

One could not but be impressed with the broad and enlightened views held by the administrators of Siam that one met, by their desire to study thoroughly their subjects and to apply the latest up-to-date methods where they were suitable. Despite the absence of any medical or public health facilities in the outlying areas, Siam is, I should say, the only country in the east which uses its flying service, both civil and military, to transport patients requiring urgent surgical or medical aid from outlying districts to Bangkok and to transport medicine like sera to outlying places from Bangkok.

During the scientific session of the F. E. A. T. M. itself, I attended the complete session of the Section of State Medicine. Several very interesting papers were read and I took part in most of the discussions on the papers. A full account will be published of the papers and the discussions; these transactions should probably be available during the present year. One very interesting paper was by Dr. de Langen on "The electrical charges of the atmosphere in the tropics on sultry days"—he states that the feeling of lassitude and headache is not due only to disturbance of heat exchange, but to a negative condition of the atmospheric electricity—I intend if possible to get readings of this nature in Calcutta and also to see the effect of "air conditioning" on the electrical condition of the conditioned air. This line of investigation should prove very interesting. Dr. Sniders gave a good paper on the yellow fever problem of the Far East—he is inclined to the opinion that dengue fever and yellow fever are specifically akin and may give counter-immunity. The question of a reservoir of these infections in the indigenous monkey tribes also calls for consideration and investigation. The Conference passed a resolution approving of the prohibition of the introduction of yellow fever virus into the Far East, where it is not endemic, for experimental purposes of any nature. Tropical typhus in Malaya seems a definite entity and Dr. Anigstein who has been working at Kuala Lumpur gave an interesting account of his investigations. The louse is not the carrier in Malaya—the carrier has not yet been identified. Dr. Anigstein regards proteus X19 as the cause of typhus; and the proteus bacillus would appear to be even more pleomorphic than when it originally got its name. Dr. Anigstein considers that all the forms of organisms he found, viz., rickettsia cocco-bacilli, pasteurella-like organisms. The louse can be easily infected with the Malayan typhus and acts as an efficient carrier but is not the local carrier. Dr. Scharff gave a paper on "The Training of Sanitary Inspectors in Malaya" which led to a useful discussion on the place of the sanitary inspector in tropical sanitary administration, his scope and his training. I mentioned the rural health organisation scheme in Bengal and the useful part now being played by the sanitary inspector (in preference to the sub-assistant surgeon). The other papers, on tropical headgears, school health in Siam, ultra-violet radiation in relation to health in the tropics, ventilation of houses in the tropics, women's medical education in India, and the training of health workers in the tropics, were all of great interest, but it is not possible to go into the details of all these papers here. I found also the discussion of the subjects brought forward of great interest and I was able to place before the Congress the results of Indian experience on most of the various aspects of public health and hygiene considered.

Medical News.

INTERNATIONAL CONGRESS OF TROPICAL MEDICINE, AMSTERDAM.

THE Executive Committee of the International Congress of Tropical Medicine give the following particulars concerning the second Congress, to be held in Amsterdam in 1932.

1. After the much-regretted death of our Prof. C. Eijkman, Prof. G. Grijns assumed the presidency of the Congress.

2. The Committee—in order to meet the majority of wishes—definitely fixed the dates of the Congress for September 12th to 17th, 1932.

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3. In accordance with the answers to the previous circular, the subjects to be discussed have been fixed as follows:—

(a) Avitaminoses, with special reference to beri-beri.
(b) Leptospira and yellow fever.
(c) Helminths, with special reference to ankylostoma.
(d) Malaria, blackwater fever, protozoan blood diseases and kala-azar.

Two reporters will be invited to read papers on each subject. The inscription fee has been fixed at £1 (Dutch Guilders 12.50).

THE INDIAN RADIOLOGICAL ASSOCIATION.

AT a meeting of medical men interested in radiology and allied subjects held at the Chittaranjan Seva Sadan, Calcutta, on Monday, 2nd February, 1931, it was decided to form an Association to safeguard and protect the interests of those engaged in practising these branches of medical science and those of the lay public who may take advantage of such treatment. The constitution and objects of this Association are set forth as follows:—

Constitution and objects.

1. Whereas the use of the Röntgen rays and electricity in medicine has made such rapid progress in recent years, and whereas the interests of medical men who have specialised in these methods of treatment and those of the lay public who take advantage of such treatment, should be safeguarded and protected, it is considered desirable to form an Association of those engaged and interested in such subjects.

2. The Association shall be known as the Indian Radiological Association.

3. Members may be enrolled from amongst the following:—

(a) Medical radiologists and other medical and dental practitioners.
(b) Physicians.
(c) Engineers and manufacturers.
(d) Radiographers.
(e) Others interested in *x*-rays, radio-activity, and physiotherapy and allied sciences.

4. The objects of the Association shall be to promote the advancement and study of radiology, radio-activity, radium therapy, physiotherapy and allied subjects in India; and to take whatever steps may be deemed necessary to this end, such as, encouraging discussion of radiological problems, promotion and maintenance of centres of research and teaching, and co-operation with workers in these subjects both in India and abroad.

5. The entrance fee will be Rs. 10 and the annual subscription for membership Rs. 24. The latter may, at the option of the member, be paid in 12 monthly instalments of Rs. 2 each.

6. The transactions of the Association will be published at first in one or more of the reputable medical journals of the country and later on, when circumstances permit, in its own journal.

THE X-RAY INSTITUTE OF INDIA, DEHRA DUN.

THE attention of our readers is drawn to a sale of radiological and electro-therapeutic apparatus, which is taking place in consequence of the closing of the above institute.

Further details will be found in our advertisement page xcii.

INTERNATIONAL HEALTH YEAR-BOOK, 1929.

THE Health Section of the League of Nations has just published its International Health Year-Book for 1929.

This is the fifth volume of this publication, and it contains information concerning forty countries: Australia, Austria, Belgium, Canada, Czechoslovakia, Denmark, Dominican Republic, Egypt, Estonia, Finland, France, French Colonies, Germany, Greece, Hungary, Irish Free State, Italy, Japan, Latvia, Lithuania, the Netherlands, Norway, Poland, Portuguese India, Roumania, Spain, Sweden, Switzerland, Turkey, the United Kingdom (England and Wales, Scotland, Northern Ireland), Ceylon, Federated Malay States, Straits Settlements, British Somaliland, Union of Soviet Socialist Republics, the United States of North America, the Philippines, Uruguay.

The object of the year-book is to give a survey of the progress made by the various countries in the domain of public health. It indicates new developments in the working of the various health services, gives the most recent data as regards vital and health statistics and reviews the work of the principal international organisations dealing with public health, such as the League of Red Cross Societies, the Rockefeller Foundation and the League Health Organisation.

The information contained in the year-book is furnished by the heads of national health services or persons deputed by them for this purpose.

The statistics and data concerning each of the forty countries are arranged on the uniform lines adopted by the League Health Organisation and include twenty-seven standard tables. These tables are designed to present the minimum of vital statistics necessary to allow the reader to interpret correctly the information relating to health conditions in any given country and to compare the health conditions of the various countries.

The twenty-seven tables fall into the seven following groups:—

1. *General demography.*—(4 tables: area and population according to the results of the last two censuses; density of population and excess of one sex over the other, according to the results of the last two censuses; distribution of the population by age and sex, according to the results of the last census and the more recent estimates of this distribution; survey of the movement of the population, 1922 to 1928.)

2. *Birth-rates.*—(5 tables: geographical distribution of births in 1927 and 1928; number of births according to sex and vitality, 1922 to 1928; births and abortions in certain districts; legitimacy and illegitimacy of births for the years 1922 to 1928; monthly number of live-births, legitimate and illegitimate, in 1926, 1927 and 1928.)

3. *General death-rate.*—(4 tables: geographical distribution of general death-rate in 1927 and 1928; death-rate according to sex for the years 1922 to 1928; death-rate according to age and sex, 1926 and 1927; seasonal distribution of deaths in 1927 and 1928.)

4. *Causes of deaths.*—(6 tables: mortality, incidence and case fatality of certain infectious diseases in 1927 and 1928; death-rate from tuberculosis according to age and sex in 1927; death-rate from tumours, 1926 to 1928; deaths from puerperal diseases for the years 1926 to 1928; death from external causes and general death-rate from natural causes from 1926 to 1928.)

5. *Infant mortality.*—(3 tables: infant mortality according to days and months of age, sex and legitimacy in 1926 to 1928; seasonal variations in the death-rate of legitimate and illegitimate children under one year of age in 1926 and 1927; mortality according to causes of death in 1926 and 1927.)

6. *Public health statistics.*—(2 tables: institutions for the campaign against social diseases; institutions for the protection of mothers and children, in 1926, 1927 and 1928.)

7. *Data on curative medicine.*—(3 tables: statistics of hospitals, etc., in 1926, 1927 and 1928; statistics of sanitary personnel in 1926, 1927 and 1928; statistics of health insurance funds in 1926, 1927 and 1928.)

The year-book also contains a survey of industrial hygiene in Germany, Belgium, Great Britain, Italy and the Netherlands.

THE INDIAN SCIENCE CONGRESS, 1932.

THE nineteenth Annual Meeting of the Indian Science Congress will be held at Bangalore from the 2nd to the 8th January, 1932. Lieutenant-Colonel A. D. Stewart, I.M.S., School of Tropical Medicine, Central Avenue, Calcutta, has been appointed President of the Section of Medical and Veterinary Research.

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In view of the fact that a very large number of papers have been received in past years making it impossible to read all of them in the time available, and necessitating the curtailment of discussion on others, the Sectional Committees have been advised to make a careful selection of papers accepted. Authors are requested to take note of the following points:—

(*i*) Papers on medical and veterinary research *must* be received by the Sectional President, Lieutenant-Colonel A. D. Stewart, I.M.S., School of Tropical Medicine, Central Avenue, Calcutta, not later than the 15th October, 1931, which is the last date for accepting papers according to the rules.

(*ii*) Only original papers, that is to say, papers which have not already been read or published in the same or similar form, will be accepted.

(*iii*) Not more than two papers will be accepted from any one contributor.

(*iv*) Papers must not take more than 20 minutes to be read. It takes 3 minutes to read a page of foolscap intelligibly, apart from diagrams, slides, etc. Papers should not, therefore, exceed 7 pages of typed foolscap.

(*v*) Papers *must* be accompanied by 3 *typed copies* of an abstract of the paper. This abstract must not exceed 200 words, and should not contain any formulæ or diagrams. *Papers not accompanied by such abstracts will not be accepted.* It is not fair to members of the Congress not to have due notice from the programme of what a paper is about.

(*vi*) All diagrams, tables, pictures, etc., should be reduced to lantern slides, or enlarged to posters corresponding in type to 6/18 Snellen.

(*vii*) Authors should not contribute accounts of their papers to the local lay press. It is hoped that it will be possible to arrange for a daily précis of the proceedings in the Medical and Veterinary Section to be sent to the press officially by the president of the section.

(*viii*) Workers in Bengal and neighbouring provinces are requested to send their papers before the 21st September, 1931. The attention of workers is drawn to the resolution of the Executive Committee that abstracts of papers submitted after the last date, i.e., 15th October, 1931, *shall on no account be printed in the advance copy of abstracts.*

(*ix*) Papers will not be accepted from individuals who have not paid their subscription for membership. Forms of application for membership can be obtained from the General Secretary, Asiatic Society of Bengal, 1, Park Street, Calcutta.

Will our readers kindly take this notification as the first official intimation with regard to the 1932 Congress? We trust, further, that the members of the medical and veterinary professions in Bangalore will co-operate to make the 1932 Congress a successful one.

There are three classes of members of the Indian Science Congress; viz.:—

(*a*) Full members; annual subscription, Rs. 10.

(*b*) Associate members; annual subscription, Rs. 5.

(*c*) Student members (who must be certified by the Principal of their college to be such), Rs. 2.

Only full members have the right to read papers. Associate and student members may submit papers through a full member. Subscriptions should be paid to the Honorary Treasurer, Indian Science Congress, C/o Asiatic Society of Bengal, 1, Park Street, Calcutta.

THE INDIAN HONOURS LIST, 3rd JUNE, 1931.

THE following are the names of doctors and nurses and others associated with medical institutions in the Indian Honours List of date the 3rd June, 1931. We offer them our congratulations.

Knighthood.

Brevet-Colonel Samuel Richard Christophers, Director, Central Research Institute, Kasauli.

Lieutenant-Colonel Henry Albert John Gidney, M.L.A., Indian Medical Service (Retired).

Kaisar-i-Hind Medal (First Class).

Miss G. Beckett, Chief Lady Superintendent, Lady Minto Indian Nursing Association.

Miss Hilda Keane, Medical Superintendent, Victoria Zenana Hospital, Delhi.

Miss A. Woodard, Medical Officer-in-charge, American Presbyterian Memorial Hospital, Fatehgarh.

Mr. Ian Ross Anderson, Medical Officer-in-charge, Kalna Mission Hospital of the United Scottish Churches Mission, Bengal.

Kaisar-i-Hind Medal (Second Class).

Miss Sara Lyle McElderry, M.B., CH.B., Irish Presbyterian Mission, Borsad, Bombay.

Joseph Louis Pinto, L.R.C.P. & S., L.F.P.S., Director of the Vaccine Institute, Belgaum, Bombay.

Reverend Frank Woodard Ross, Hony. Superintendent of the Raniganj Leper Home, Wesleyan Mission, Bengal.

Swami Shyamananda Monk, in charge of Ramkrishna Mission Hospital, Rangoon, Burma.

Miss Margaret Elizabeth Buckley, Nurse at the Welsh Mission Hospital, Shillong, Assam.

Miss Ruby Ellen Glanville, Medical Officer-in-charge, Indian Troops Child Welfare Centre, Peshawar, North-West Frontier Province.

M.B.E.

Shivram Wamanji Patil, J.P., Medical Practitioner, Bombay.

I.S.O.

Major E. F. Hottinger, Civil Surgeon, Punjab.

Ghulam Rasool, Superintendent, Medical Branch Headquarters, Northern Command.

Rai Bahadur.

Lala Brahma Gupta, Provincial Medical Service, Medical Officer-in-charge of the Manohar Das Eye Hospital, Allahabad, United Provinces.

Mr. Sundershun Hariram Pandit, Medical Officer-in-charge, Ophthalmic Department, King Edward Hospital, and Lecturer in Surgery and Eye Diseases, King Edward Hospital and Medical School, Indore, Central India.

Rao Bahadur.

Captain Kalandi Manakatan Anantan, Madras Medical Department, Civil Assistant Surgeon, Secunderabad.

Shifa-Ul-Mulk.

Hakim Muhammad Saiyid Sadiq, Unani Medical Practitioner, Calcutta, Bengal.

Rai Sahib.

Babu Satish Chandra Gupta, Medical Practitioner, Jalpaiguri, Bengal.

Lala Banwari Lal Gupta, Officer-in-charge, Sadar Hospital, Moradabad, United Provinces.

Babu Ram Dhan Banerjee, Medical Officer of Health, Fyzabad, United Provinces.

Subedar Chuhar Singh, Indian Medical Department, Sub-Assistant Surgeon, Baluchistan.

Jethmal Manikrai Idnani, Subordinate Medical Service, Officer-in-charge, Tando-Alhyar Dispensary, Hyderabad District, Sind.

Batlagundu Subramanya Ramaswamy Iyer, Sub-Assistant Surgeon, Henzada, Burma.

Poonamalle Arumagam Gnanasagara Muddaliar, Sub-Assistant Surgeon attached to Municipal Hospital, Syriam, Burma.

Biharilal Chhotalal Vachhrajani, Bombay Medical Service, Officer-in-charge, West Hospital, Rajkot, Western India States Agency.

Ravishankar Vajeshankar Chhaya, Assistant Superintendent of Vaccination, Western India States Agency.

Khan Sahib.

Franroz Hormusji Anklesaria, Subordinate Medical Service, Port Health Department, Bombay.

Maulvi Fazlur Rahman Khan, Bengal Medical Service (Upper), Assistant Surgeon, Patuakhali Subdivision Dispensary, Bakarganj, Bengal.

Taing-kyo-Pyi-Kyo-Saung.

U Po Hla, Health Officer, Moulmein Municipality, Moulmein, Burma.

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Current Topics.

Tonsillectomy.

(Abstracted from *The Medical Journal of Australia*, February 7th, 1931, p. 173.)

SOME months ago an interesting discussion took place in the columns of this journal on the application of the various methods for the removal of tonsils. Enucleation by dissection, the method of Sluder, and diathermy were in turn advocated by different writers. No definite conclusions of a general nature emerged from the discussion and since a request has been received for a statement in these columns, it is thought advisable to reopen the question. In the first place, it is possible to make certain definite statements in regard to the three types of operation. Sluder's operation, though easy of completion, always results in incomplete removal of the tonsil. The lower pole remains. In many patients, particularly young children, tonsillectomy (it should really be called partial tonsillectomy) by this means appears to be satisfactory. When this happens, either there was no gross infection of the tonsil before operation, or the remaining lower pole, if infected, has remained undiscovered. Enucleation of the tonsil by dissection is to all intents and purposes the ideal method in that it results in the immediate removal of all the tonsillar tissue. The disadvantage most often mentioned is hæmorrhage, either of a secondary or recurring nature. With diathermy the tonsil is gradually destroyed by desiccation and the process is a lengthy one, extending often over several weeks. It is important to remember that in assessing the value of different procedures comparisons must be made only of the results of experts. It would be obviously wrong to compare the results of a surgeon adept at enucleation by dissection with those of another surgeon who was but newly acquainted with the technique of diathermy. Comparisons should be made only when all the attendant circumstances (type of anæsthesia, assistance, and so forth) are strictly comparable. Some men compare their results obtained by a well-tried and perfected technique with those obtained by their prentice hands with another. Further, when the immediate results of admitted masters are compared remote results must not be lost sight of. These are more difficult to ascertain. A. D. Kaiser has recently shown in a study of upwards of four thousand children, observed over periods up to ten years, that the real value of the removal of tonsils and adenoids cannot be definitely established in a few years and that apparent benefits during the first few post-operative years are not so evident over a ten-year period. He showed that removal of tonsils has a beneficial effect on the incidence of sore throat and susceptibility to scarlet fever and diphtheria. What is more important to the present discussion is that he found that incomplete tonsillectomy does not offer the same protection against the usual throat complaints and infections as complete tonsillectomy.

Several conclusions may be drawn. In the first place Sluder's operation, if used at all, should be reserved for tonsils not grossly infected. It should be used with the full knowledge that it results in incomplete removal of the tonsil and that a second operation may be necessary. It should be pointed out in this connection that Fowler, in his recent and extremely valuable book on tonsil surgery, has admitted that even after complete removal recurrence may take place in 1 per cent. or 2 per cent. of cases. In the second place, enucleation is probably the most suitable operation for quite a large number of candidates for tonsillectomy. That the process is completed at one sitting and that a dissection carried out under clear vision leaves no doubt as to complete removal, are strongly in its favour. If a general anæsthetic is to be given, the associated risk must be considered. Diathermy has, as its protagonists point out, the advantage of allowing patients to continue with their daily work. Surgeons, who use enucleation in their practices and advocate it strongly, have been known to have their own tonsillar tissue destroyed by diathermy. If they made their choice from a desire not to break the continuity of their work, well and good; if they sought diathermy because of risk of post-operative complications, it is time they gave up enucleation by dissection. They should not expose patients to risks they themselves are not prepared to take. The disadvantages of diathermy are two—that the treatment is protracted and that certain patients tire of it before desiccation of all tonsillar tissue is complete. In stating these conclusions we wish to emphasize again that they are stated on the supposition that the operations in question are performed by experts. Though complications are always liable to occur, they are less liable to occur in the hands of experts. If one operation is more fool-proof than another, and if fools must perform operations, they should restrict their activities to the sphere best suited to them. Difficulty in technique should be no bar to its mastery. The condition of certain patients will sometimes call for a certain type of procedure. If the surgeon be not expert with the requisite method, he should hand the patient over to someone who is. The patient must here, as always, be the first consideration.

The Modern Treatment of Syphilis.

By L. W. HARRISON, D.S.O., M.B., F.R.C.P.E.

(Abstracted from *The Practitioner*, February 1931, Vol. CXXVI, No. 2, p. 193.)

I PROPOSE in this article to discuss mainly the treatment of syphilis in its early stages, that is, within the first six months, because this appears to be the problem in syphilis which calls most urgently for settlement. The existing diversity of opinion as to what is necessary to eradicate the disease in its early stages must be responsible for much of the under-treatment to which great numbers of patients are being subjected at the present moment. Apart from the risks to which under-treatment exposes the patient's future health, it is the deadly enemy of progress in the campaign against the spread of syphilis because, although it may render patients non-infectious at first, this is only temporary, and the eventual result is to leave in the community large numbers of infectious persons. Infectious, too, in a way which is more dangerous than before treatment because the state of the patient is not manifested by external signs. Even to-day there are large numbers of practitioners who treat only until the serum reactions become negative, and then either wait and see if they will revert to positive or continue the treatment only with the feeble mercury by mouth for the traditional two years. It must be obvious to anyone who thinks, that the first negative serum reaction does not mean the death of the last spirochæte in any but a small proportion of cases and that, therefore, the great majority of patients treated on such lines must continue to harbour the organism in their cardio-vascular systems, testicles, central nervous systems and other important tissues. It may be argued that the fact of such a patient not being cured would become manifest on the blood being tested, but only a small proportion of patients treated by practitioners who lay such store by a negative serum reaction trouble to have further serum tests.

The case of the patient whose treatment is continued with mercury by the mouth is little better because, if not cured by the energetic treatment of the first course, it is unlikely that his surviving spirochætes will succumb to the feeble attack of a few mercury pills. As I know from past experience of soldiers treated conscientiously with mercury for two years and from observation of later effects, the most that this is likely to do is to keep the serum reactions negative and everybody concerned in a fool's paradise.

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For my present purpose I propose to use some results of treatment carried out on male cases in my own clinic, mainly to show what some forms of treatment will not do; in other words, to indicate minima of treatment.

In 1919 I formulated a programme of treatment for average cases in each of the stages of syphilis to be dealt with in my clinic, and this programme remained unaltered so far as male cases were concerned until the early part of 1928, when it was changed, as will be shown later. The unit course was as follows:—

Day of treatment.	"914" grm.	With Hg. grm.	or with Bi. grm.
1st	0.45	,, ..	,, ..
8th	0.45	,, 1	,, 0.32
15th	0.45	,, 1	,, 0.32
29th	0.60	,, 1	,, 0.32
36th	0.60	,, 1	,, 0.32
50th	0.75	,, 1	,, 0.32
57th	0.75	,, 1	,, 0.32
78th	0.75	,, 1	,, 0.32
85th	0.75	,, 1	,, 0.32
92nd	0.75	,, 1	,, 0.32
TOTALS.	6.3 g.	with Hg. 9 g.	or with Bi. 2.88 g.

The gaps between the 3rd and 4th, the 5th and 6th, and the 7th and 8th injections were to allow intolerance to declare itself. In place of "914," given intravenously, sulpharsenobenzene was given deeply and subcutaneously to a number of the patients. Mercury was given intramuscularly in the form of a 10 per cent. mercurial cream. It was later superseded by bismuth, given as a deep subcutaneous injection in the form of oxychloride; the dose shown in the table is the amount of metallic bismuth, the actual amount of the compound being 0.4 grm. in 4 c.cm. suspension. Potassium iodide was given from the 57th to the 78th days.

For a case of primary syphilis with negative serum reaction, two such courses were prescribed, with an interval of two months; for a sero-positive primary case, two such courses, followed by a 36-day one consisting of 3 × 0.60 grm. "914" and 2 × 0.75 grm. "914," with corresponding mercury or bismuth; and for an early secondary case, the same as for a sero-positive primary plus a further course similar to that just mentioned.

The results were assessed by clinical relapses and by reversions of the serum reactions to positive, which occurred after suspension of treatment for periods varying from three months to seven years. The method of the Wassermann test which was employed was that known as No. 1 of the Medical Research Council's Special Report Series, No. 14. This method has been shown in two laboratory conferences held in Copenhagen and in a large number of comparisons in this country to be the most delicate Wassermann test which does not afford non-specific results. This is important, since a number of workers assess their results by serum tests which are by no means sensitive.

The broad results of the analysis were as follows: In sero-negative primary cases only the series treated with more than two such courses as that outlined above showed no relapse. The relapses in the series of sero-positive primary cases which received this amount of treatment and in a small group of cases which had been treated with three such courses were altogether about 10 per cent., and the same percentage occurred in the secondary cases which had been treated with at least three full courses. I have interpreted these results as meaning that the minimal amount of treatment to be given to a sero-negative primary case is three full courses such as first outlined, and that for one which has become sero-positive, whether still primary or now secondary, at least one further course is necessary.

If this is the case, it means that, where the eradication of syphilis from a community is desired, there must be a unanimous determination to administer to every case of early syphilis not less than the amount of treatment just mentioned. The secret of success in this matter lies in unanimity amongst medical practitioners. As long as patients continue to be told by some practitioners that a few injections are all that is necessary to cure their syphilis, they will regard lightly the advice of those who are striving to be thorough, and will continue to default in large numbers from clinics.

Being dissatisfied with the immediate results of the scheme of treatment outlined above, I have attempted to improve it. At first I tried increasing the intensity of the course so that, with the same amount of bismuth, 8.75 grm. "914" was administered in 92 days, in place of 6.3 grm. The immediate effect of the course, in terms of negative serum reactions, was no better, and the incidence of toxic effects became uncomfortably high in spite of the precaution taken to dissolve each dose of "914" in 10 c.cm. of a 10 per cent. solution of sodium thiosulphate. Accordingly, about 2½ years ago, in the male department of my clinic, I substituted the following:—

Bismuth, 0.32 grm. per week from 1st to 64th day.
"914," 0.45, 0.45, 0.60 grm. on 1st, 8th and 15th days.
"914," 0.75, 0.90 grm. on 43rd and 50th days.
"914," 0.90 grm. on 78th, 85th, 113th and 120th days.

As will be seen, it differs in respect of the arsenobenzene compound considerably from those usually prescribed. Its principles are that three moderate doses of "914" (to test the patient's tolerance) are followed by an interval of four weeks and then by pairs of doses which quickly reach 0.9, but are spaced out by intervals of one month. On the other hand, bismuth is administered each week from the commencement until a total of 3.2 grm. has been given.

The immediate effects of the two types of courses on early syphilis which has become sero-positive can be compared in the following table, from which it will be seen that those of the new course have been better.

Stage of syphilis.	Cases.	OLD COURSE. (6.3 GRM. IN 92 DAYS.) SERUM REACTIONS AT END OF COURSE.			Cases.	NEW COURSE. (6.75 GRM. IN 120 DAYS.) SERUM REACTIONS AT END OF COURSE.		
		Positive.	Doubtful.	Negative.		Positive.	Doubtful.	Negative.
Sero-positive primary	120	5	11	104	89	4	3	82
Early secondary	167	31	25	111	47	2	2	43

The incidence of jaundice attendant on the new course was greater until I adopted the plan recommended by Dreyfus of dissolving each dose in 20 c.cm. of 40 per cent. glucose, when it became decidedly less. It is necessary to see that the glucose is neutral. In the St. Thomas's Hospital Clinic 4 c.cm. of 4 per cent.

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sodium hydrate have to be added to each 250 c.cm. of glucose. I suggest that this course deserves a wider trial. Apart from its therapeutic merits, it has advantages for migrant patients who may not be able to receive injections every week.

The minimum treatment prescribed for sero-negative primary cases is three of these courses, and for early cases which have become sero-positive, three beyond the first which ends with negative serum reactions, with an interval of six weeks between the last injection of "914" in one course and the first in the next. By serum reactions is meant here the Wassermann and at least one flocculation, because in treated cases the serum often gives a positive flocculation reaction when the Wassermann is negative, and sometimes the reverse occurs.

The choice of bismuth preparations is one which must puzzle many practitioners. The number of preparations on the market is legion, and the literature on the subject has reached the dimensions of a family bible. It is difficult to advise without running the risk of being unfair, but the following is the result of a study of clinical effects and of many published reports on absorption and excretion of different compounds.

In the treatment of early syphilis rapidity of effect is usually achieved by the injection of an arsenobenzene compound. Each dose of this passes through the tissues, delivers its blow and is excreted in a very few days, leaving the spirochæte to recover, especially the spirochæte in the less accessible parts of the meninges. The rôle of the other metal employed is to maintain the attack in the intervals between the injections of "914" and for some time after these have temporarily been suspended. It has been shown that, to achieve the destruction of *Sp. pallida*, a certain minimum must be taken up and maintained in the tissues. Below this "metallic potential" the spirochætes flourish, or are only restrained. A water-soluble preparation may be absorbed and excreted too quickly for this purpose, and some, such as tartrates and citrates, cause considerable discomfort. A further consideration is that a quickly absorbed preparation can call on the kidneys to excrete more bismuth *per diem* than they can manage, and renal irritation may result, so that individual doses must be comparatively small, and, to maintain the required amount of bismuth in the tissues, injections must be given two or even three times a week. On the other hand, in choosing a preparation which is absorbed more slowly than the water-soluble, one may go to the other extreme and fix on one which remains at the site of injection too long, perhaps becoming encysted there. I am strongly inclined to think that this may happen with the class of preparations in which bismuth is given in a state of fine subdivision. It is true that, on injection, bismuth is precipitated from all compounds, except bismuth thioglycollate, but it must be taken up again more quickly in the case of some preparations than in that of others. For example, it is well known that the soluble form of the tartro-bismuthate of potassium and sodium after precipitation at the site of injection is more quickly absorbed than is any insoluble compound (though this may have been suspended in a watery medium) and it seems likely that, in general, bismuth is taken up again by the tissues more quickly and regularly from a compound than from the metal itself.

The insoluble compounds suspended in a watery medium are more evenly and regularly absorbed than are those in an oily suspension, and the absorption of the oxychloride is satisfactory. At the same time the absorption of the salicylate and of the sub-salicylate suspended in oil is not so irregular as to constitute a danger of too great an accumulation at the site of injection.

Using either of these preparations, a sufficiently large dose can be injected once a week to maintain a constant supply of the metal in the tissues without calling on the kidneys to excrete more *per diem* than is good for them. The oxychloride suspended in a watery medium, and, perhaps, the salicylate in an oily one, seem therefore to meet the requirements of tolerability, of medium rate and regularity of absorption, and of convenience in average cases of early syphilis under treatment also with effective doses of an arsenobenzene compound.

In early cases where, for any reason, arsenobenzene treatment cannot be exploited to the full, one would turn more and more to the soluble preparations, of which there are available some that are soluble in water and others that are soluble in oil. Of the water-soluble I would avoid the tartrates and citrates because they cause too much discomfort. Some workers have found the oil-soluble preparations eminently satisfactory both in experimental and clinical work, and careful analyses of urines of patients to whom different compounds of bismuth had been administered showed that the absorption of this type of compound is far more even than is that of any insoluble one. It is necessary to repeat that, if a soluble preparation is chosen, it should be injected at least twice each week.

A question of considerable importance is whether, in early cases, bismuth or mercury should be given concurrently with (i.e., in the same course as) the arsenobenzene compound. I am convinced that, *in early cases*, one or other of these metals should always be given in at least the first course for the following reasons:—

(1) In the early days of salvarsan-therapy when salvarsan was given alone syphilitic neuro-recurrences became very frequent, and in my experience they have occurred in by far the majority of cases in patients treated only with arsenobenzene compounds. It is often argued that the neuro-recurrences in the early days were due to the fact that the patients had received only one or two doses of salvarsan. This, however, is not completely true; I have seen cases of neuro-recurrence which have received many more than one or two injections. Further, it is well known that in pre-salvarsan days, by far the majority of patients received at most only a few weeks' mercurial treatment, but that clinically manifest neuro-recurrences were comparatively rare. There seems to be sufficient reason for this in the fact that salvarsan abruptly ends the interaction between skin and parasite, and so the development of a protective immunity, but may fail to destroy the spirochætes in the central nervous system.

(2) Analysis of the cerebro-spinal fluid of cases after different forms of treatment shows a far higher proportion with pathological fluid in those treated on the alternating plan than in those on the concurrent plan; thus the fluid was found to be pathological in 74 out of 85 cases treated by arsenobenzene alone, and in 14 out of 34 treated by alternating courses of arsenobenzene and mercury, but in only 3 out of 42 treated with arsenobenzene and mercury administered concurrently.

(3) Numerous workers have expressed the view that neuro-syphilis has increased since the introduction of salvarsan treatment. Others have expressed a contrary view, and in Great Britain a careful inquiry a few years ago showed no evidence of an increase. I believe that the difference in the evidence on this question lies in the exclusive use or not of arsenobenzene in the first course.

In my own clinic in over ten years, during which I estimate that over 3,000 early cases of syphilis have been treated on the concurrent plan, the number of clinically manifest neuro-recurrences has been one.

In contrast with this, Moore and Kemp's analysis of 402 cases of early syphilis (out of 2,500 treated on the alternating plan) revealed no less than 59 relapses of this kind, though their treatment was with the more effective "606," and 21 had received more than one course of injections with mercury in the interval.

Apart from the fact that the concurrent method of treatment is less likely to result in neuro-syphilis, there is some evidence to show that the presence in the circulation of another metal enhances the effect of an arsenobenzene compound. Thus it has been found that

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the trypanocidal effect of sulfarsenol was greater when any of a variety of other metals was in the circulation at the same time than when it was given alone, and later this was confirmed in a comparison of the trypanocidal and spirillicidal effects of zinc-sulfarsenol with those of sulfarsenol and "914" respectively.

If my views are right, those who are now treating their early cases on the plan of alternating courses of arsenobenzene with courses of mercury or bismuth are laying up for their patients a heritage of neuro-syphilis.

In early cases of syphilis which have not become completely sero-negative by the end of the first course, it is probable that the patient has not been able to make of the injected remedies those derivatives "the arsenoxide" and the proteo-bismuth combination (Levaditi's bismoxyl) which are essential to the destruction of the parasite. A careful search of the patient may discover an indifferent metabolism requiring correction. At any rate, a change of compounds as also perhaps a change from the intravenous to the deep subcutaneous or intramuscular route, is indicated.

A brief reference only can be made to the treatment of syphilis in its later stages. The case of the latent syphilitic with irreversible serum reactions is one on the treatment of which opinions are greatly divided. My own view is that such cases are harbourers of *Sp. pallida*, and must be kept under treatment, as an insurance. If the cerebro-spinal fluid is positive, adjuvant pyrogenic treatment by malaria, intravenous injections of anti-typhoid vaccine, intramuscular injections of sulfosin, or similar means is indicated. In cases of cardiovascular syphilis some workers would withhold arsenobenzene treatment as unsafe. I find that small doses of one of the sulpharsenobenzene compounds, given as a deep subcutaneous injection twice or even three times a week, in conjunction with bismuth have afforded excellent results. In late cases of syphilis of the liver, I would rely only on bismuth and iodides, as the arsenobenzene compounds are liver poisons.

Reviews.

EMERGENCY SURGERY.—By Hamilton Bailey, F.R.C.S. (Eng.). Volume I, Abdomen and Pelvis. Bristol: John Wright and Sons, Ltd., 1930. Pp. xviii plus 380, with 324 illustrations, some of which are in colour. Price, 25s. net.

HAMILTON BAILEY'S "Physical Signs in Clinical Surgery" has achieved such well-deserved popularity amongst students that a new work by the same author is assured beforehand of a warm welcome. The present book is just as practical as its predecessor, though it is addressed, not to students, but to junior surgeons and to those who, with comparatively limited experience, find themselves suddenly called upon to deal with grave emergencies. The title is perhaps misleading, for the book deals only with operative treatment and not at all with diagnosis, but within this more limited field it will be found of great value, especially to surgeons working abroad. It is based on a wide practical experience, and much of the material comes from the author's own case notes.

A preliminary chapter on instruments, preparation, and abdominal incisions is followed by a survey of all the commonly occurring abdominal emergencies and most of the rare ones also. The directions for performing the operations are detailed and clear, and include many practical "tips," which should be of great value to those with less clinical experience. Where there is so much that is good it is only possible to select a few points for comment. The advice to explore the appendix first through a gridiron incision in cases of grave general peritonitis, where the diagnosis of the cause is uncertain, is thoroughly sound, and would possibly lead to the saving of lives now lost by the adoption of incisions which open the abdomen widely and take more time to close. The whole chapter on appendicitis is very good, and, needless to say, the Ochsner treatment, for the use of which in cases of over forty-eight hours' duration the author has brought forward convincing evidence, is treated in great detail. The reviewer, after two years' experience of its use in this class of case, can vouch for its value, and for the low mortality bill when it is employed, but the details of the treatment must be followed with meticulous care if the best results are to be obtained. "Burst abdomen" is an awkward accident, for which detailed directions for treatment are not usually given in books, and many surgeons will be grateful to the author for including a very practical section on this subject. Suppuration in the deep iliac glands is much more common in this country than in Europe from various causes, and one is glad to see it included. The great value of transfusion of blood in cases of hæmorrhage from gastric and duodenal ulcer and after gastro-enterostomy is emphasised, in fact it is advised as the mainstay of the treatment, and, amongst other "tips" not usually to be found in books, is a method for compressing the hepatic artery to arrest hæmorrhage from the cystic artery or from a wound of the liver. The sections on intestinal obstruction and on strangulated hernia are excellent, and contain directions for dealing with strangulated sliding hernia, retrograde strangulation, and other matters which are usually left in a state of obscurity.

The later chapters of the book deal with the emergent operations on the urinary system, and here one is glad to see that the metal catheter is forbidden in cases of retention of urine, the operation of supra-pubic catheterisation is described, and its scope and that of supra-pubic cystotomy are clearly defined.

The book is beautifully printed and sumptuously illustrated; it can be strongly recommended to surgeons in India as a sound guide to practice in these difficult cases, and it is to be hoped that the publication of the second volume will not be long delayed.

W. L. H.

A TEXTBOOK OF THE SURGICAL DYSPEPSIAS.—By A. J. Walton, M.S., M.B., B.Sc., F.R.C.S. (Eng.), Surgeon, London Hospital; Late Surgeon, Poplar, Greenwich and Evelina Hospitals; Late Hunterian Professor, Royal College of Surgeons. Second Edition. London: Edward Arnold & Co., 1930. Pp. 720. Illustrated. Price, 42s. net.

THE first edition of this book, published in 1923, met with a very cordial reception from the profession. It was founded on a close and detailed analysis of the symptomatology, in relation to the operative findings and results of treatment, of the author's own series of cases, with a careful examination of the literature of the subject. All teachers who have used the book will admit the help they have derived from its clear-cut clinical pictures in putting a difficult subject before students, and many surgeons must be grateful for the detailed and well-illustrated accounts of operations which it gives.

In the seven years which have elapsed since the appearance of the first edition a large amount of work has appeared on upper abdominal surgery, opinions have crystallised on many doubtful points, increased experience of end-results of treatment has modified views, and the author's own list of cases has trebled in number. Some new sections have been added, many have been entirely re-written and others have been curtailed, so that the size of the book remains practically unaltered. Nevertheless, it has undergone a most thorough revision, there is hardly a page on which some sentences have not been altered or whole paragraphs re-written, old statistics and references deleted, and new matter inserted.

The section on the ætiology of gastric and duodenal ulcer has been entirely recast in the light of the volume

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of evidence pointing to infection as the main ætiological factor, but amidst such a wealth of references to literature it is surprising to find no mention of Mann's experiments on the production of ulcer by certain operative procedures. Into the controversy which has raged round the treatment of chronic ulcer by medical means, the author does not plunge deeply, but contents himself with quoting some telling sets of figures. For instance, David Smith in 214 cases, followed for from 5 to 15 years, found only 29 per cent. of cures and 19 per cent. of deaths; and Nielsen in 239 cases of chronic duodenal ulcer, examined 2½ to 19 years after medical treatment, found only 17 per cent. cured. Against this surgery can show a cure rate of 80 per cent. to 90 per cent., rather higher in the duodenal cases than in the lesser-curve ulcers, but it is only fair to add that the right type of case must be selected for surgical treatment and must be handed over to the surgeon at a reasonably early stage; it is in regard to this that Mr. Walton's book will be found so helpful; he is emphatic in his warnings of the danger of operating indiscriminately on acute and bleeding ulcers. Syphilis and tuberculosis of the stomach have attracted some attention of late, and these subjects are adequately dealt with in a new section. Duodenal diverticula and ileus have been allotted more space, and new work has been included; other articles which have had to be entirely rewritten to bring them into line with modern views are those on the relationship between gastric carcinoma and pre-existing ulcer (the author in a series of 229 cases of carcinoma finds that 10 per cent. originated in an ulcer), and that on gastro-jejunal ulcer, the view that high acidity is the most important of several possible factors being accepted. The advice to treat dental sepsis after and not before the operation is undoubtedly sound, the danger of temporarily increasing the oral sepsis being a very real one.

The author has always belonged to the conservative school of gastric surgery and prefers to treat lesser-curve ulcers by excision and gastro-enterostomy rather than by partial gastrectomy. He has not changed his views, and is able to point to a 92 per cent. cure rate; only for the more severe cases, where there appears to be a possibility of carcinoma, does he perform the more severe operation. New articles appear on congenital cysts of the bile-ducts and on cholecystography, both excellently illustrated. The subject of visceroptosis does not occupy so much space in this edition, but it has lost nothing in the process of condensation.

The new edition is sure to enhance the reputation the book has always enjoyed; it can be recommended to all surgeons, and even physicians might learn something by studying such a temperate presentation of the surgeon's point of view.

W. L. H.

AN INTRODUCTION TO PRACTICAL BACTERIOLOGY.—By T. J. Mackie, M.B., D.P.H., and J. E. McCartney, M.D., D.Sc. Third Edition. Edinburgh: E. & S. Livingstone, 1931. Pp. xv plus 421. Illustrated. Price, Rs. 7-14. Available from Messrs. Butterworth & Co. (India), Ltd., Calcutta.

MACKIE AND MCCARTNEY have brought out a new edition of their popular book "An Introduction to Practical Bacteriology." Although it is only three years since its predecessor appeared the authors state that the rapid and "continued development of bacteriological knowledge and technique has necessitated certain additions to the text and the amplification of many sections." Going through the present volume one finds useful additions practically in every chapter. The authors have not only included interesting new material wherever necessary but have also unhesitatingly deleted such information as appeared to be of less practical importance. In this way the volume has been brought quite up to date, and the information contained therein, though brief, does not lack clearness. It is therefore thoroughly to be recommended as an excellent textbook for medical students whether they be under-graduates or post-graduates. For purposes of revision prior to examination it is a book *par excellence.*

K. V. K.

STONE IN THE URINARY TRACT.—By H. B. W. White, M.B., Ch.B. (Edin.), F.R.C.S. (Edin.), F.R.C.S. (Eng.). London: J. & A. Churchill, 1929. Pp. 344, with 2 coloured plates and 181 text-figures. Price, 25s. net.

THIS is a sound book by a writer with very extensive practical experience of the subject. The division of the subject-matter under different headings is logical, and the bold face type at the beginning of each paragraph helps the reader to obtain rapidly a thorough grasp of the subject and at the same time tends towards easy reference. The illustrations are of the highest quality and add considerably to the clarity of the text. The book is much better value for the student and practitioner than many of the more pretentious tomes that have been published on this subject. We can strongly recommend it.

OSTEOMYELITIS AND COMPOUND FRACTURES AND OTHER INFECTED WOUNDS. TREATMENT BY THE METHOD OF DRAINAGE AND REST.—By H. W. Orr, M.D., F.A.C.S. St. Louis: The C. V. Mosby Company, 1929. Pp. 208. Illustrated. Price, $5.00.

THIS is certainly a stimulating book. The treatment advocated by Dr. Orr for both osteomyelitis and compound fractures is a very distinct departure from the usual procedure. As the author is an orthopædic surgeon of some considerable standing one is compelled to give the book and the methods advocated serious attention. For osteomyelitis he advocates immediate free draining at whatever stage the condition has reached, the maintenance of the part at absolute rest by the use of plaster casts or other means of bone fixation, primary asepsis or antisepsis produced by free incision and removal of the sequestra, avoiding strong antiseptics, the maintenance of free open drainage by means of a sterile vaseline pack, avoidance of daily antiseptic dressings, and the maintenance of all injured parts in their correct anatomical position throughout the whole healing process. He recommends treatment for compound fractures on much the same lines.

We can strongly recommend this book to surgeons with a hospital practice.

MEDICAL AND SURGICAL REPORTS OF THE EPISCOPAL HOSPITAL. VOL. VI. 1921-30.—Edited by John H. Arnett, M.D. Philadelphia: Press of Wm. J. Dorman, 1930. Pp. 460. Illustrated.

THE annual reports of the larger American hospitals are usually valuable and interesting documents. The Medical and Surgical Reports of the Episcopal Hospital of Philadelphia are this year of more importance than usual. The volume commemorates the seventy-fifth year of the hospital's existence, and for this reason special articles reminiscent of the early days of the hospital are included.

Dr. Morris contributes a sketch of early medicine compiled from the records. It is the same story with which we are all familiar, and yet one that leaves us amazed at the progress that has been made in the comparatively short time of seventy-five years. Blood letting, tartar emetic, opium and calomel were the sheet anchors of the practitioners of those days. There were no hypodermic syringes or clinical thermometers and the stethoscope was a large and unwieldy instrument. It was not until 1899 that the board recognised the necessity for a clinical laboratory.

When we read the later articles we realise the difference between those days and now.

But all this has not been accomplished without a great increase in expense, and in a short article we learn that the average daily cost of a patient in 1865 was

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ninety cents, but that in 1928 it was more than three and a quarter dollars. The average time under treatment of a patient in the same years has fallen from 39 to 17 days.

There are other articles that show the growth of the work done in this hospital, such as "Seventy-five Years of Gall Bladder Surgery" and "Fractures 1853 and Now." It is not possible in a short review to discuss all the contributions. It must be sufficient to state that they cover the routine work of a large general hospital. They are all interesting and the authors are authorities on their subjects. The volume is very well printed and produced. The illustrations are good and there is a small but complete index.

H. H.

LIPPINCOTT'S QUICK REFERENCE BOOK FOR MEDICINE AND SURGERY.—By G. E. Rehberger, A.B., M.D. Seventh Edition. Revised. London: J. B. Lippincott Company, 1930. Price, Rs. 48-12. Obtainable from Butterworth & Co. (India), Ltd., Calcutta.

THIS is the ideal book for the one-book medical practitioner. In it he will find almost anything that he could possibly want to know. It is in its seventh edition, so it ought not to be necessary to give a detailed description of it, but for those who are not familiar with it we shall give some of its outstanding features. It is divided into 11 sections, general medicine and surgery, this is naturally the biggest section, gynæcology, genito-urinary diseases, obstetrics, skin, eye, ear, nose and throat diseases, orthopædics, and drugs; there is also a pharmacological index and a page or so on weights and measures. The separate sections are thumb-indexed so that it is a matter of a second to turn to the right section. In each section the subjects are arranged alphabetically. There is very free cross-referencing, which certainly helps the busy practitioner and saves him any need to think at all; in places this is almost overdone; for example, under "P" we find "Plastic Bronchitis, *see* Bronchitis." For each disease the symptomatology, ætiology, diagnosis, etc., are given, in many instances at some length, but treatment is always dealt with in considerable detail; in every instance there are a number of prescriptions—a feature which will have a special appeal in this country. Under "Poisons" there is a long table covering several pages giving poison, symptoms and antidote, or rather treatment, and two coloured plates of dangerous plants. In the skin disease section there are a number of very helpful plates; these vary somewhat in quality and I think that many cases of scarlet fever and measles would go undiagnosed if one relied entirely on the pictures of these two conditions. On the other hand, some of the plates are excellent. Under the heading "Syphilis" the writer has not been content to give the clinical diagnosis and treatment, but has included a detailed description of the technique of the Wassermann test—this seems to us to be distinctly beyond the scope of the book.

We do not claim to have read the book from cover to cover, but we have turned up a large number of headings and have found under nearly all that the latest information on the subject has been incorporated. Tropical diseases have not been quite so fortunate. The section on malaria appears to be up-to-date, but that on oriental sore and kala-azar is 10 years out of date as far as treatment is concerned, and by definitely stating that the latter disease is transmitted by sand-flies, the author is a little bit ahead of the workers in this country.

The book is expensive, but you get a great deal for your money. The pages are not numbered, so we can not say off hand how many there are, but the book weighs 8½ lbs. and contains good solid information.

L. E. N.

INTESTINAL TUBERCULOSIS.—By L. Brown, M.D., and H. L. Sampson. Second Edition. Thoroughly Revised. London: Baillière, Tindall and Cox, 1930. Pp. xiv plus 376, with 2 coloured plates and 122 figures in the text. Price, 22s. 6d. net. Postage, 9d.

THE first edition of this book was so popular and the subject-matter was so important that it is not surprising that a new edition has been called for.

The presence of intestinal tuberculosis as a complication of the pulmonary disease has long been recognised. Whether it is merely a terminal complication, a concurrent infection or even the primary focus of the disease has for many years been debated.

The work that has been done at the Trudeau Laboratories has solved many of the problems of this difficult subject, and this book is the fruit of these investigations. The authors are to be congratulated. They have shown to the medical profession methods by which the disease can be diagnosed in the majority of cases. They have fully studied the pathological changes that occur and they have developed a method of treatment that offers great hope to those whom we considered a few years ago to be suffering from an incurable disease.

Their arguments, conclusions and methods are lucidly explained in this book.

The history of the disease, its pathology and clinical symptoms occupy the first part. These are admirably described. The subject of the Röntgen ray findings then follows, and it is this that is so important for accurate diagnosis. We quote from the preface. "It may be of interest to call attention to the fact that 5,542 patients have been examined röntgenologically in regard to intestinal tuberculosis and 1,465 have been found to be suffering from it."

The technique that is employed is carefully described and explained.

Treatment is described in the last part of the book. General methods combined with artificial heliotherapy give remarkably good results.

This is pioneer work, and the reviewer knows of no other source from which the same information can be obtained. It will be essential to all those who have the care of cases of tuberculosis, and also to the radiologist without whose help diagnosis may be impossible.

The book is well printed, beautifully illustrated and has a complete bibliography and index.

H. H.

THE TREATMENT OF ASTHMA.—By A. H. Douthwaite, F.R.C.P. (Lond.), M.D. London: H. K. Lewis and Co., Ltd., 1930. Pp. 164. Price, 7s. 6d. net.

ALTHOUGH a considerable amount of study and research have been directed towards the elucidation of the problems involved in asthma, our conceptions regarding this mysterious malady are still in the melting pot, and are undergoing frequent changes. New data are appearing from time to time and are being emphasized by new schools of thought, only to be discarded shortly afterwards when their shortcomings have been demonstrated by still more newly discovered facts. Neither is it uncommon to find distinguished authorities on the subject at variance with one another in respect of some fundamental ideas about the causation and manifestations of the asthma syndrome. The clinician, therefore, is left to formulate his conclusions and find out his own lines of treatment from the ever-increasing mass of literature and, more often than not, finds himself in hopeless confusion. To these people, Dr. Douthwaite's book will be particularly welcome, as it gives an admirable presentation of the salient facts relevant to the treatment of asthma. It will not only help them to keep themselves abreast of the modern developments, but will serve as a practical guide in the management of asthma patients. The book, however, does not contain anything new and

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those who approach the treatise with the idea of obtaining a fresh and original light on the subject will be disappointed. Though remarkably free from dogmatism or bias, there is sufficient evidence in the book of the impress of the author's valuable personal experience in connection with several lines of treatment, e.g., physiotherapy and vaccine therapy.

R. N. C.

MEDICINE: ANALYTICAL REVIEWS OF GENERAL MEDICINE, NEUROLOGY AND PEDIATRICS. Vol. IX, December 1930, No. 4. Baltimore: The Williams and Wilkins Co. Pp. 413—506. Price 23s. 6d. per volume. English agents: Baillière, Tindall and Cox.

PNEUMONOCONIOSIS or pigmentation in the lungs due to inhalation of foreign particles, as a distinct disease entity, has come prominently to the forefront in the present age of civilization and industry. In early text-books on medicine there is seldom found any mention of the disease and, even in many modern treatises, not more than a passing reference is accorded to the subject. The medical officers in mining areas and industrial centres, therefore, are greatly handicapped in their early diagnosis, treatment and prevention of a condition which is too often likely to lead to fatal results. The admirable monograph on "Pneumonoconiosis and Tuberculosis" in the December 1930 issue of *Medicine* will therefore be welcome. The early signs, symptoms, pathology, diagnosis, and prognosis have all been given. The types of dust and the rôle of the various occupations in the causation of the disease have been dealt with at some length. No less attention has been paid to the vexed question of the relationship between tuberculosis and pneumonoconiosis. The author admits that there is a much higher incidence of pulmonary disease among workers in the mines than among the general population, but points out that pneumonoconiosis *per se* has been too often incriminated in utter disregard of the part played by contributory factors, like bad nourishment, bad hygienic surroundings, and overwork. He also takes objection to the validity of the statistical data with regard to the incidence of tuberculosis in pneumonoconiotics, so often put forward from early records; the separate identity of pneumonoconiosis does not appear to have been sufficiently recognised before, and almost all pulmonary diseases among miners, which could not be identified as distinct disease entities, were grouped under the head of tuberculosis. The question of prophylaxis and treatment has also been described satisfactorily. The author is to be congratulated on the wealth of information presented in such a small compass.

R. N. C.

MEDICINE: ANALYTICAL REVIEWS OF GENERAL MEDICINE, NEUROLOGY AND PEDIATRICS. Vol. X, February 1931, No. 1. Baltimore: The Williams and Wilkins Co. Pp. 133.

IT is a pleasure again to bring to the notice of the medical profession and research workers the valuable articles appearing in *Medicine*, published by the Williams & Wilkins Co., of Baltimore. The February 1931 issue contains two very interesting articles on "The velocity of blood flow in health and disease" and "Bilirubinemia," both of which reflect great credit on the authors. The first article covers about 75 pages, and is very comprehensive and thorough. The velocity of blood flow in normal and pathological individuals has been determined. An increase is found in thyrotoxic patients with or without cardiovascular disease whereas in myxœdema, rheumatic valvular disease, and auricular fibrillation, a definite slowing of the rate of flow is recorded. The effects of epinephrin and digitalis on the blood flow, and the inter-relationship between velocity of blood, the venous pressure, and the vital capacity of the lungs have been discussed. Keen students of physiology will find much in this article which will interest them and enlighten them on many obscure points in connection with the problem.

The second article will be of special value to the clinician who wants to have a clear grasp of the problems involved in jaundice, in the light of modern advances in physiology and biochemistry. The different types of jaundice and the interpretation of the Van den Bergh reaction have been very clearly dealt with. This journal deserves to be read by all medical men who wish to keep abreast of the times.

R. N. C.

CHOLERA AND ITS TREATMENT.—By R. K. Guin, L.M.F., B.M.S. Second Edition. Calcutta: The Book Company, Ltd., 1931. Pp. x plus 101, with 5 illustrations. Price, Rs. 2-8.

THAT there is a need for a small handbook on cholera for the use of students and general practitioners, is evident from the production of a second edition of this book, within two years of the first edition.

Although there have been many additions and corrections, the book still requires very careful revision. The general arrangement of the book is curiously similar to that of the chapter on cholera in Manson's Tropical Diseases, and the text appears to us to possess in many parts a strong resemblance to that of the standard textbook. Only, when the author has varied or added some of his own experiences, many gross errors have crept in. We will not attempt to enumerate them; there are too many.

This is exactly the type of book that ought never to be published. It will only confuse the reader.

C. L. P.

IL COLERA: EPIDEMIOLOGIA, PATOLOGIA, BATTERIOLOGIA, TERAPIA e PROFILASSI.—By Prof. G. Sanarelli. Milano: S. A. Instituto Editoriale Scientifico, 1931. Pp. xix plus 559, with 96 illustrations. Price, L.90. (In Italian.)

THIS is a most excellent publication and contains all the information one would like about cholera. We do not know of any other book that deals with the problems of cholera so exhaustively. The epidemiology, bacteriology, treatment and prevention of cholera are dealt with in a most scholarly manner and in a most lucid style. The text is fully illustrated with excellent photographs and diagrams. The photographs of clinical cases of cholera and of the pilgrim centres in India and elsewhere are particularly good, Professor Sanarelli is to be congratulated on the production of this book which will prove most useful to all those engaged in the study of cholera. The type and reproduction of the illustrations leave nothing to be desired. There is just one drawback; the book is in Italian. We hope that it will be found possible to have an English translation of this book.

C. L. P.

AIDS TO MEDICAL DIAGNOSIS.—By Arthur Whiting, M.D. Fourth Edition. London: Baillière, Tindall and Cox, 1931. Pp. viii plus 180, with 16 figures in the text. Price, 3s. 6d. net.

THERE have been three previous editions of Aids to Medical Diagnosis; we have not seen any of them, but we should like to think that they were less exasperatingly inaccurate than the present one. For example, we are told (on p. 19) that enteric fever "is diagnosed by a process of exclusion more often perhaps than any other disease," there is no mention of blood culture. This book is presumably intended for medical men practising in England; why, therefore, take the trouble to mention the agglutination of Shiga's bacillus with the serum of the patient as a means of diagnosing bacillary dysentery and at the same time omit all reference to the Flexner strains? Incidentally the interpretation of serum agglutination tests in bacillary dysentery is not so easy as Dr. Whiting appears to imagine. These are small points, but there is worse

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to follow. The author has floundered badly in the section on liver abscess where we are told that in cases of perforation into the lung there is expectoration of matter like anchovy sauce which may show *Amœba coli* (author's italics).

In the chapter on diseases of the blood and ductless glands we read of blood-plates—why not platelets? We are told that leukocytosis occurs normally during digestion (recent work seems to show that the supposed occurrence of this phenomenon is a myth), and we encounter a neologism, viz., hypoleucocytosis, which appears to us to be devoid of any real meaning. We are shown several tracings of the jugular and radial pulses in various forms of heart disease but there is a complete absence of electro-cardiograms. The junior student, studying the table on p. 99, would certainly conclude that ægophony is a peculiarity of the breath sounds, while the statement on p. 118 to the effect that the normal blood-urea content "is about 40 mg. per cm. of blood" is nearly as full of errors as it could be.

The letterpress to Fig. 13 (p. 132) showing the position of the motor tracts in the internal capsule refers to the nucleus cuneatus instead of the nucleus caudatus. This may be a printing error but the fact that the brain does contain a nucleus cuneatus—nowhere near the internal capsule, however—makes the error a pernicious one. Reading this book one would not suspect that the afferent nerve fibres in the spinal cord have any connections with the cerebellum.

Finally, the English of the book is frequently careless and slipshod, as in the statement that..... "In malaria, with its intermittent fever, the plasmodia are to be found in the blood with a leucopenia....." In its present form this book will add nothing to its author's reputation.

J. M. H.

HANDBOOK OF DISEASES OF INFANTS AND CHILDREN.—By F. M. B. Allen, M.D., M.R.C.P. (Lond.). London: Baillière, Tindall and Cox, 1930. Pp. 595. Price, 15s. net.

THIS is an excellent textbook of the smaller size; it is written in a clear style and is well abreast of modern views on pediatrics. The author has sifted his subject carefully so that the most important points are presented. Theoretical considerations are as far as possible omitted, thus saving space which is devoted to practical matters.

Biochemical and pathological data are given when such are necessary to an appreciation of the condition under discussion. The book is arranged in the conventional manner, opening with diseases of the newly-born, passing by way of discussion on infant feeding to the digestive disorders of infancy and finally to the general disorders of infancy and childhood.

Treatment is laid down on modern lines and such matters as the use of serum in scarlet fever and measles, Tolysin in acute rheumatism and Nirvanol in chorea, come up for discussion. In a book of this size it is clearly impossible to make an exhaustive survey of the whole subject, some omissions are inevitable, but we cannot help thinking that a chapter on diabetes, some mention of the functional disorders of the heart in the young, and a fuller account of marasmic conditions, would add considerably to its value. The appendix contains, among other useful material, tables of growth and the development of functions by which normal progress may be judged. There is also a pharmacopœia. The book may be recommended to students both pre- and post-graduate. It presents a clear outline of the subject and will stimulate those who find a special interest to have recourse to more comprehensive text-books or monographs.

E. H. V. H.

A HANDBOOK ON DISEASES OF CHILDREN.—By Bruce Williamson, M.D. (Edin.), M.R.C.P. (Lond.). Edinburgh: E. & S. Livingstone, 1931. Pp. 290, illustrated. Price, Rs. 7-14. Available from Butterworth & Co. (India), Ltd., Calcutta.

THIS book is a new departure; it is an attempt to confine within the limits of one small volume the whole subject of the diseases of infancy and childhood.

It would seem that the minimum essential of a handbook is that the student who has thoroughly studied it should have gained an acquaintance at least with the elements of the subject. It is doubtful if this requirement is here fulfilled; in order to include some description of all known diseases, however rare, the author has encroached upon space urgently needed for those more common and, consequently, more important. This is particularly noticeable in certain sections, as for instance, in that on digestive disorders. The description of appendicitis, again, is allotted less than half a page. There are certain innovations in the book which are welcome. The physiological and anatomical data of normal childhood are not collected in one chapter, as is usual, but such facts as are appropriate to the subject under discussion are given, ready to hand, at the head of each chapter.

The section on diseases of the heart is instructive and there is much interesting matter on the subject of the disorders of rate and rhythm. The distinction between intrinsic and extrinsic tachycardia affords a sound clinical basis for the investigation of such cases, but no mention is made of the "sugar-shortage" heart.

As a "cram" book before examination this book will be popular with students, but as an introduction to the practice of pediatrics it lacks the detail necessary for correct diagnosis and treatment.

E. H. V. H.

CLINICAL NUTRITION AND FEEDING IN INFANCY AND CHILDHOOD.—By I. N. Kugelmass, M.D., Ph.D., Sc.D. London: J. B. Lippincott Co. Pp. xix plus 345, with 37 illustrations. Price, Rs. 18-12 net. Obtainable from Butterworth and Co. (India), Ltd., Calcutta.

THIS is an interesting book. It is an exposition of the art of infant feeding supported by facts and figures culled from laboratory analysis and experiment. It is written to advocate first of all, prophylaxis against disease induced by incorrect feeding, and secondly, "specific nutritional therapy," that is, the treatment of induced disorders of metabolism by appropriate dieting.

The book may be divided into three parts, the first or introductory part deals with the chemistry of nutrition, both with regard to the essential constituents of the food, and to the physiological processes of its digestion and absorption. A section is devoted to basal metabolism, its alterations in disease and the estimation from this of caloric requirements under varying conditions. A contrast is made between the acid- and base-forming foods, and this subject is elaborated later in connection with diet tables suitable to various diseases.

The second part deals mainly with diseases attributable to incorrect feeding, including deficiency diseases, and thin appropriate dietetic treatment. Little mention is made of other therapeutic measures and it might strike the critic that, while the line of treatment is essentially sound, the outcome cannot, in practice, be as confidently foretold as it is in the book. Further, there appears to be a tendency to over-estimate the influence of incorrect feeding in cases in which the primary fault may have been some inherent disability in the child. This is exemplified by the statement that "marasmus is a chronic nutritional wasting in infancy due to improper artificial feeding", thus ignoring the large and more difficult class of infant who wastes on any form of diet. The ketogenic diet in the treatment of epilepsy is discussed and its use advocated in chorea.

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Many valuable diet tables are given and at the end of the book there is a full analysis of food-stuffs giving their caloric and vitamine values. Each chapter is supported by a wealthy bibliography. The book contains a vast amount of valuable information, and in his postulate that the treatment of infants is primarily dietary the author will receive the support of all pediatricians; he further renders service by emphasising the importance of accurate dietetics in the treatment of certain general diseases, but it must be frankly stated that the information is not offered in a palatable form. The text is overloaded with scientific elaboration of perfectly simple facts and needlessly amplified with sentences, which tend to obscure the meanings, such as the following:—"bodily processes proceed uninterruptedly when all its cells are in equilibrium."

There is further a tendency perhaps to claim too much for certain lines of treatment, and to dogmatise in large type over matters on which opinion is divided, as in the statements that pellagra can be prevented and cured by adequate intake of vitamine G., and that acrodynia is a deficiency disease.

The book is intended for the general practitioner, and though he will find in it much valuable and even essential information, we are inclined to think that the majority will prefer their information in a more easily assimilable form.

E. H. V. H.

HAPPY MOTHERHOOD.—By Peggy Winifred Yeomans. London: William Heinemann (Medical Books), Ltd., 1931. Pp. 160. Price, 3s. 6d. net.

THIS excellent little book is written for mothers who do their own housework and who must exercise strict economy in the upbringing of their children.

The early chapters are devoted to the expectant mother. In addition to much sound advice on all physical matters pertaining to pregnancy and reassurance in regard to the discomforts inevitable to this condition, more attention is paid to the mental outlook and general occupation than is usual in the colder atmosphere of scientific textbooks. Experience of children born during the war has shown us how important is this side of ante-natal care. The few words reminding husbands of their duties at this period are worthy of consideration.

All details as to the outfits necessary for the mother and baby, at the time of birth and after, are given.

The chapters on nursery routine and discipline are admirable, and are written by one who has evidently studied the psychology of the infant.

The section on artificial feeding is the one weak spot in the book; little mention is made of fresh cow's milk, and a series of artificial foods, with little reference to their relative values, is recommended, thus tending to encourage the common, but deplorable, habit of flitting from one food to another without reference to the real requirements. In this connection we might mention that we are not convinced of the necessity of lime-water during teething, provided that the natural food is well balanced.

The later sections deal with the feeding of children at a later stage with useful examples of daily diet, and, finally, there is a chapter on simple first aid and sick nursing.

E. H. V. H.

AN INTRODUCTION TO CLINICAL PERIMETRY.—By H. M. Traquair, M.D., F.R.C.S. (Ed.). Second Edition, Revised and Enlarged. London: Henry Kimpton, 1931. Pp. 281, with 179 illustrations and 3 coloured plates. Price, 30s. net.

THIS is the second edition of this work which was first published in 1927, and the rapid appearance of the second edition within the space of three years is sufficient proof of its popularity and usefulness. The book is an amplification of the Middlemore Essay for 1920 on "Perimetry (inclusive of Scotometry), Its Methods and Its Values to the Ophthalmic Surgeon." It does not attempt to deal exhaustively with perimetry, but only to introduce the reader to its essential principles, considered in their clinical aspect.

In dealing with the methods of field testing, the author describes simple procedures which are both easy and satisfactory. He does not discuss the numerous variations of apparatus which are advocated from time to time, but claims that success in perimetry will be attained by the application of simple principles. The procedure described in his book is essentially the method of Bjerrum who discovered more than thirty years ago that he could obtain more information by using the back of his consulting room door than he could from the ordinary perimeter.

The book consists of two parts. Part I deals with the normal field of vision, perimetric instruments, methods of examination, and physiology of the visual field in relation to clinical perimetry. Part II deals with the pathological field, the interpretation of changes in the visual field, the choroid and retina, glaucoma, the optic nerve, the chiasma, the suprachiasmal pathway, and the functional changes of the field of vision.

Separate chapters are devoted to each of these headings. There is also an appendix in which is described the isopters for white and colour in the normal field, the blind spot, the anatomical relations of the visual pathway, the sheath and connective tissue framework of the optic nerve, the blood supply of the visual nerve path, and other uses of the perimeter and screen, and in which tables of tangents and degrees for use with Bjerrum's screen are given. Finally, the book contains an exhaustive bibliography of 362 references.

In the second edition, practically no changes have been made from the original. A notable addition is a diagram in colours showing the probable pathway of the visual fibres at the chiasmal crossing. The number of diagrams has been increased to 179.

The book is a monumental work, and of paramount importance to every ophthalmic surgeon. Quantitative perimetry is simplified and made interesting. We cordially recommend this work to all students of ophthalmology; it will be found to be one of the most useful books of reference in the library of the ophthalmic surgeon.

E. O'G. K.

PROCEEDINGS OF THE ALL-INDIA OPHTHALMOLOGICAL SOCIETY. Vol. I. Session 1930. Printed at the Huxley Press, Madras. Pp. xv plus 110, with 6 plates.

THIS little book of 110 pages contains a list of the officers and committee of the All-India Ophthalmological Society elected at the preliminary meeting held in Bombay in March 1929; the names and addresses of 64 members of the Society are recorded. It also contains the rules and regulations of the All-India Ophthalmological Society, in which it is announced that an anonymous donor has presented the Society with the sum of Rs. 3,000 for the purpose of providing a medal every year for the best work done in ophthalmology by an ophthalmologist resident in India. The medal will be known as the Dinshaw Shavukshaw Adenwalls medal.

The list of communications contains the address of welcome by the chairman of the reception committee and the presidential address by Dr. D. G. S. Acharya. The scientific articles are fourteen in number.

The article on the distribution of trachoma in India by Dr. C. N. Shroff is interesting. An effort is made to find out in which parts of India trachoma is prevalent, and it is not commonly recognised that trachoma is a disease uncommon in Bengal and southern India, where the climate is free from extremes, and is moist.

In the article on eye affections in leprosy, Dr. Ratnakar states that 50 per cent. of lepers have eye complications. In Dr. Muir's clinic at the School of Tropical Medicine, Calcutta, the percentage of ocular leprosy is not more than 10 per cent. This is the

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largest leprosy clinic in India where cases are diagnosed early and treatment carried out before the eye can be affected.

In a country the size of India, where distances are so great, the holding of a successful All-India Ophthalmological Society is difficult, but it is very desirable that such an organisation should exist, and it is hoped that its size and importance will grow. One of the great problems, where the Society should endeavour to exert its influence, is in the prevention of blindness, for which so far so little has been done.

The proceedings of the first meeting of the Society are encouraging, but so far hardly worthy of the great ophthalmic work done in India in the past.

We recommend the book to all ophthalmic surgeons practising in India in the hope that they may join this Society and so co-operate in the prevention and cure of the various and many eye diseases of India.

E. O'G. K.

RADIUM THERAPY: PRINCIPLES AND PRACTICE.—By G. E. Birkett, M.C., B.A. (Cantab.), M.R.C.S. London: Cassell and Company, Ltd., 1931. Pp. x plus 186, with 6 coloured and 13 half-tone plates and 52 illustrations in the text. Price, 17s. 6d. net.

THIS account of radium therapy is for the most part a record of the technique which is used at the Manchester and District Radium Institute, although other methods are referred to; it represents the accumulated experience at a large centre over a considerable period of years.

The work consists mainly in a lucid exposition of the general principles of radium treatment and a detailed discussion of the application of radium to particular regions.

The early chapters deal with general principles of radium therapy, protection, selection of cases for treatment, and radium burns. The remainder of the volume is concerned with the regional application of radium and covers all varieties of malignant growths which are accessible to radium treatment. Generally speaking, the author is in favour of the use of radium element instead of radium emanation. He points out that the insertion and uniform spacing of radon seeds to give an effective dose to a large tumour is much more difficult than with radium needles. He also mentions that the modern tendency is to use large quantities of radium from a distance—the so-called bomb treatment, and that the extensive employment of radon seeds is a retrograde step.

The book is amply illustrated both in colour, and in black and white. Many pictures of cases before and after treatment are given, and these illustrate the immense value of radium in the treatment of malignant disease.

Many excellent little books have been published on the theory and practice of radium treatment, but this is the best I have seen, up to date. The author recognizes that radium has limitations, and that results still depend on the skill and experience of the operator.

The publishers are to be congratulated on the clear printing and excellent reproduction of paintings and illustrations.

J. A. S.

THERAPEUTIC USES OF INFRA-RED RAYS.—By W. Annandale Troup, M.C., M.B., Ch.B. (St. And.). London: Actinic Press, Limited, 1930. Pp. 57. Illustrated. Price, 5s. 6d. net.

THIS book supplies a distinct want, giving a concise account of the infra-red rays. There is no elementary book on the subject, so that it gives the enterprising practitioner a brief outline of how to study the therapeutic effect of the different infra-red rays. These rays are divided into three zones which vary in wave length from eight thousand Angström units up to half a million or more. The author describes the degree of penetrability of these waves, how they affect the skin mostly, then the muscular tissue, finally the fascia and bones. The various types of generators that supply the sources of these waves are depicted and described briefly. The methods used for detecting these infra-red radiations by the bolometer, radiometer, thermopile and thermocouples are mentioned, but no description is given of them. The technique of administering these rays and the symptoms produced by over-dosage are briefly described.

A very interesting chapter on the combined use of the infra-red and ultra-violet radiations shows that the infra-red rays accelerate the effect of the ultra-violet rays. The last part of the book deals very briefly with the different clinical conditions in which these infra-red rays have been found to be useful. The book can be recommended to the practitioner as a brief introduction to the study of the therapeutic effect of these rays.

H. W. A.

IRRADIATION WITH THE ALPINE SUN QUARTZ LAMP INCLUDING SOME ACCOUNT OF LUMINOUS HEAT RAYS.—By Dr. H. Bach. Slough: The Sollux Publishing Co., 1931. Pp. viii plus 218, with 23 illustrations. Price, 10s. 6d. net. Agents in India: Thacker, Spink and Co., Calcutta and Simla.

THIS little volume, consisting of 210 pages, presents an account of the widespread clinical work done on the Continent in the above subject during the past 25 years. The writer, Dr. Bach, is a man of international fame as a pioneer in the use of this treatment. The aim of the present volume is to give a short summary of all that is worth knowing concerning the Alpine Sun Quartz Lamp, and includes in addition some account of the luminous heat rays of the spectrum.

The book is divided into three parts. Part 1 deals with ultra-violet therapy and includes a general account of the physiological and therapeutic action of sunlight, artificial ultra-violet light, and luminous heat rays. Part 2 is concerned with the instruments in use for the production and application of such rays. Part 3 gives an account of the indications and uses of quartz lamps. The subject-matter of parts 1 and 2 has already been adequately dealt with in catalogues and monographs. Part 3 represents the accumulated knowledge of various continental writers. Each chapter concludes with a summary setting forth the conditions in which quartz light treatment has been found of value. This work is indispensable not only to workers in this branch of therapy, but also to general practitioners who wish to know in what conditions light therapy may be beneficial.

J. A. S.

CLINICAL ELECTRO-CARDIOGRAMS: THEIR INTERPRETATION AND SIGNIFICANCE.—By F. A. Willius, B.A., M.D., M.S. Philadelphia and London: W. B. Saunders Company, 1929. Pp. 219. Illustrated. Price, 36s. net.

THIS book might well have been described as an atlas of electro-cardiography. It contains nearly a thousand electro-cardiograms illustrating different disorders of the heart. The text consists of an interpretation of these electro-cardiograms. Though strictly speaking it is not a textbook on the subject, the examples are so numerous that every conceivable condition of disordered heart beat is discussed. With a sound knowledge of the general principles of electro-cardiography and this book for reference any intelligent doctor should soon become a specialist on the subject.

RECENT ADVANCES IN FORENSIC MEDICINE.—By Sydney Smith, M.D., M.R.C.P., D.P.H., and John Glaister, Jr., M.D., D.Sc., J.P. London: J. & A. Churchill, 1931. Pp. vi plus 194, with 66 illustrations. Price, 12s. 6d. net.

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of Forensic Medicine at Cairo, the former of whom is now Regius Professor at Edinburgh. The writers have worthily upheld the traditions of the "Recent Advances" series by the presentation of up-to-date accounts of selected subjects in chapters of moderate length. The first four chapters deal with firearm injuries, identification of firearms, cartridge cases and bullets and the examination of explosive powders and their residues. This subject has undergone much development recently, and, as the authors show, it is very remarkable what can now be done by an expert equipped with modern instruments. An excellent chapter on the examination of hairs follows next. This is a matter of great forensic importance upon which information has until recently not been as full as could be wished. One of the writers has carried out a good deal of original work on this subject and the importance of cross-sectional examination of hairs is stressed. This has been largely neglected in the past, owing mainly, no doubt, to its technical difficulty. The next subject taken up is the serological analysis of blood-stains and tissues, the account of which is quite adequate. The question of blood grouping and inheritance is then discussed. A good account is given of the methods used. On the vital question as to whether conclusions arrived at as to paternity and other questions from the application of Mendelian conceptions to the inheritance of blood groups may be accepted unreservedly or not the writers do not speak with any certain voice, although the unfortunate conflict of opinion in the Supreme Court of Prussia in 1927 is fully detailed. The accuracy of these conclusions is now fully accepted and as this book is likely to be widely read by Bench and Bar we think that in a future edition this fact should be emphasised. We see no reference to the outstanding work of Bernstein in this connection.

Next follows an interesting chapter on the estimation of carbon monoxide in the blood by the Hartridge reversion spectroscope. This is followed by a good chapter on the use of emission spectra to detect traces of substances too small to yield satisfactory results by ordinary chemical methods. The writers discuss particularly the identification by this means of minute traces of special metals, e.g., barium and chromium, on the interior of a gun barrel as a means of gaining information as to which of the smokeless powders was used. A chapter is also devoted to the fluorescence induced in certain substances by irradiation with ultra-violet light, and the circumstances in which this phenomenon may be of forensic importance. This method, while still in the experimental stage, is of value particularly in the examination of pictures and papers, and in some cases forgeries and alterations in documents and pictures invisible in ordinary light may be clearly demonstrated under the ultra-violet. The work concludes with an account of the quantitative estimation of alcohol in the blood and urine. We are in agreement with the authors that while the test can show that a definite quantity of alcohol has been taken it cannot be relied on as proof of alcoholic intoxication. The test would therefore appear to be of very limited application.

The subjects chosen by the authors to illustrate recent advances in the kind of information which scientists can harness in the cause of justice bring out two interesting points:—

(1) The width of knowledge required in order to deal adequately with so many different kinds of analysis, and (2) how few of the new methods are in the strict sense chemical.

We congratulate the authors on the production of a first-class work which is written in a most interesting and readable way. We regret to see misspellings of proper names, even of world-wide authorities, such as Ehrlich, Shattock and Schiff. The illustrations are excellent and the get-up of the book is well up to Messrs. Churchill's high standard.

Everyone interested in forensic medicine should possess this book.

R. B. L.

A TEXTBOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY.—By John Glaister, M.D. (Glas.), D.P.H. (Camb.), F.R.S.E. In collaboration with John Glaister, Junr., M.B., Ch.B. (Glas.), M.D. (Hons.), (Glas.), D.Sc. (Glas.). Fifth Edition. Edinburgh: E. & S. Livingstone, 1931. Pp. xv plus 954, with 132 illustrations and 7 plates. Price, Rs. 22-8. Obtainable from Butterworth & Co. (India), Ltd., Calcutta.

THE fifth edition of a standard work by a leading authority calls for no extended review, and in so large a work we can only select for comment a few points of special interest. An early section gives a good account of the functions of the General Medical Council, a matter about which there is much misunderstanding. The section on medical evidence is very good. The necessity of excluding technical terms from medical evidence is aptly illustrated by the following instance quoted by the author. *The Coroner:*—"Where did the car hit him?" *Medical witness:*—"At the junction of the cervical and dorsal vertebræ." *The burly foreman of the jury:*—"Man and boy, I've lived in these parts for fifty years and I never heard of the place."

In connection with the much debated question as to medical privilege in the courts, the author refers to the solemn declaration which has to be made by graduates of medicine of the Scottish universities, which, *inter alia*, contains the following words. "And I further declare that I will keep silence as to anything I have seen or heard while visiting the sick which it would be improper to divulge." While of course the same rule of secrecy is observed by medical practitioners who are not Scottish graduates, it is conceivable that the latter may be in a stronger position to resist embarrassing questions in a court. The author quotes a case in which a medical man, in an action by a man for nullification of a maintenance order on the ground of his wife's adultery, was summoned to give evidence as to an illness which the defendant had during the period of separation. The practitioner who was a Scottish graduate declined to answer on various grounds, one of which was that it would be an infringement of his academic declaration. Notwithstanding an application by the solicitor for the plaintiff to commit the practitioner under the Summary Jurisdiction Act of 1848, the bench of magistrates, after consideration, decided not to press the question. This matter is full of difficulty and cannot be entered into here.

The brief but excellent accounts of trials which have been *causes célèbres* such as the cases of Adolf Beck, Edalji, Oscar Slater and others are of special interest and a perusal of these will convince anyone that to make a good medicolegist, in which we may include a medical witness, what is wanted is not so much extensive theoretical knowledge as a flair for intensive examination and accurate deduction. The Crippen case is referred to on pages 103 and 134, but we were unable to find the further account on page 788 referred to in the index. The reference should apparently be to page 830.

Many medical men have not a very accurate idea of the varying appearances of the virgin hymen, and it is consequently of great importance that first-class illustrations of these should be included in a work on medical jurisprudence. Those figured in this work are not particularly good, being not nearly up to the standard of those published in a recent work by the late Professor Harvey Littlejohn. We doubt the necessity for the inclusion of the Abderhalden test for pregnancy, since, though no one doubts the genius of Professor Abderhalden, his test is not usually regarded as satisfactory. On the other hand the accurate Aschheim-Zondek reaction for pregnancy ought certainly to have been described. We trust we shall not be thought captious in objecting to the expression "Serological

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tests for blood." These reactions being for the most part due to the proteins of the serum, it will be evident that they are not in the strict sense tests for blood, but are tests for the species from which the stain, previously proved to be blood, has been derived.

In view of the extensive use of antimony preparations in modern therapeutics the account of the toxicology of antimony will be read with renewed interest.

The illustrations are for the most part good, though some of the photo-micrographs, e.g., that of gonococci on page 543, are rather poor.

A separate legal index enhances the value of the work to legal readers. The work is a mine of well-arranged information in a book of attractive style which, though of considerable length, is not unduly heavy to hold. The price is very moderate for so large a work. We strongly recommend it to all students and practitioners.

R. B. L.

PSYCHOLOGY IN GENERAL NURSING.—By I. G. H. Wilson, M.D., D.P.M. London: Edward Arnold and Co., 1931. Pp. viii plus 216. Price, 5s. net.

THIS book is remarkable for several reasons. The first and foremost is that it is probably unique, for no one has yet written a book on psychology in general nursing. British nurses should feel proud that the first book on psychology and nursing has been written in their mother tongue, and by a member of the sex which has achieved incomparably the greatest achievements in nursing. The author has divided her work into three parts. The first part describes simply and very clearly some of the more important relations between the body and the mind, and the association between what are termed "mental" and what are regarded as "physical" symptoms. This portion of the book is so well done that it seems a pity the author did not write more on this topic. For instance, she would have done well to have given more notice to Adler's work on psycho-visceral correlations, because the majority of doctors and nurses are so deplorably ignorant of their ætiology and significance. While the surgeon, the physician and the gynæcologist habitually overlook the psychical element, the psychologist as often pays too little attention to the visceral aspect of the situation. The second portion of the book discusses psychology in relation to modern thought. Here the author tends to repeat the all-too-common mistake of modern psychologists of overlooking the obvious limitations of psychology. The world awaits a psychologist—or, perhaps, a philosopher—who will mark out the bounds of psychology, as Kant marked out the bounds of metaphysics. For example, the more one ponders over the concept of consciousness, the more one is led to suspect that this concept will one day be found to be outside the bounds of psychology. The third and last portion of the book deals with the practical value of an understanding of psychology in actual nursing. Here the author has a great deal to tell nurses that is of the greatest practical utility. Especially admirable are her considerations and advice on nursing mentally-disordered patients. Every serious nurse, of either sex, will do well to study this book. Indeed, the book is, on the whole, so good that it might very well be made a "compulsory" textbook for all nursing probationers.

O. B. H.

A MANUAL OF INDIAN MATERIA MEDICA.—By Dr. M. Ramachandra Mudaliar, G.B.V.C., etc. Printed at the India Printing Works, George Town, Madras, 1930. Pp. 365. Price, Rs. 4.

OF late, the indigenous systems of medicine have received a good deal of sympathy and attention, and a considerable amount of research in the domain of the Indian Materia Medica has already been set afoot by members of the medical profession. It is indeed satisfactory to note that our veterinary colleagues are also coming forward to lend their aid in this promising field of research. Dr. Mudaliar of the Civil Veterinary Department, Hyderabad, by publishing his "Manual of Indian Materia Medica" has taken a step in the right direction.

The book is replete with much useful information and will repay careful perusal. The chapters on "Drugs used by Hakims" and "Indian Plants and their Medicinal Uses" deserve special mention, and show great diligence on the part of the author. It is regrettable to find that so little care has been expended in seeing the book through the press. Six full pages of *errata*, in a book of such modest size, bear ample testimony to the justification of this complaint. Errors of omission and commission have both crept in. To mention only one or two examples—chaulmoogra oil has been described as "the oil expressed from the seeds of *Gynocardia odorata*" whereas it ought to be *Taraktogenos kurzii*. It is now known that oil derived from *Gynocardia odorata* is inactive and is not truly identical with chaulmoogra oil. Oleum morrhuæ is certainly not indigenous to India and has no right to find a place in a treatise on Indian Materia Medica. In the nomenclature of the drugs, the Hindi names have been given first, but this order has not been religiously followed in the section on "oleum." The inclusion of an advertisement at the end, again, is a thing which cannot be supported in a scientific book like this. We hope these minor details will be properly attended to in a future edition of the book.

R. N. C.

NOTES ON THE PREVENTION OF MALARIA.—By Cuthbert Christy, M.B., C.M. (Edin.), late Major, R.A.M.C. Prefaces by Sir Malcolm Watson, M.D., LL.D., and Sir Ronald Ross, K.C.B., K.C.M.G., F.R.S. Published by the Ross Institute and Hospital for Tropical Diseases, London, 1930. Pp. 47. Free of cost.

THE Ross Institute never seems to be devoid of bright ideas. We have just received their pocket tract on the prevention of malaria. It is intended for the lay public only, but in these days when the lay public, as represented by the Assam planter, is so well informed on matters connected with malaria there is a danger that it may turn up its nose at the elementary information which will be found in this tract.

It contains about 4,000 words and looks like a driving licence (Calcutta variety); however, it has certain features distinguishing it from the reviewer's driving licence, which will be referred to later. The ætiology, prevention and treatment of the disease are explained in a manner and in language that no layman could fail to understand. Under treatment, the usual warning is given against the under-strength samples of quinine which are so frequently found on the Indian market; this is appropriately followed by two full-page advertisements of a well-known English manufacturer.

For so small a book it is profusely illustrated. Figures 2 and 3, which show the adult and larval forms of anopheles and culex mosquitoes in their historical postures, should be useful, and figures 5 and 6, which show the results of mosquito control, should be stimulating, but we cannot see how figures 1, 4, 7 and 8, which are photographs of the Ross Institute, are going to help anyone to control malaria in the malaria-infected countries many thousands of miles away. (This remark must not be taken as a reflection on the excellent work being done in this cause by the staff of this institution.)

To revert to the question of the cover; it is claimed that it is damp- and insect-proof. It is certainly cockroach-proof. We left our copy for a few nights in a heavily cockroach-infested drawer; it came out unscathed, whereas its companions, which included our driving licence, nearly had their backs eaten off. We hope that other medical publishers will discover this secret.

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We hope that this little book will have a very wide distribution; it contains many valuable hints for the layman, not the least of which is a subscription form for the Ross Institute.

MALARIA AND ITS CONTROL.—By D. K. Viswanathan. Printed at the B. N. Press, Mount Road, Madras, 1931. Pp. 64. Illustrated.

THIS little pamphlet is, the author says, largely a transcription of notes taken at the malaria classes of the Central Malaria Bureau, which he has doubtless felt could be usefully placed before the malaria workers of his province in this form. The author modestly lays no claim to originality and the work may be recommended for the purpose for which it was intended.

C. S.

ANOPHELINE MOSQUITOES IN SOUTHERN RHODESIA 1926-1928.—By H. S. Leeson, F.E.S., A.R.San.I. (No. 4 of the Memoir Series of the London School of Hygiene and Tropical Medicine.) Published by the London School of Hygiene and Tropical Medicine, March 1931. Pp. ix plus 65. Illustrated. Price, 3s.

THIS is a report on the entomological investigations carried out during a blackwater survey in Southern Rhodesia by Dr. G. R. Ross.

The author has concluded that *A. funestus* and *A. gambiæ* must be incriminated for the prevalence of malaria in the area investigated.

He has made an exhaustive study into the biology of these species as well as of the others found in the locality. In this respect he has elucidated some important facts. Indian workers will be especially interested in what he says of *funestus;* for instance he found the adults more often sheltering in the open, in bushes, on grass, in natural excavations, etc., than in habitations.

The hibernation of the adult and fecund females deep down in the crevices of rocks along the river beds from which they emerge in the spring to lay their first batch of eggs is reported, but the details of this matter as well as other biological notes must be consulted in the original by all funestologists.

The reviewer has elsewhere reported that, as judged by the relative prevalence of larvæ and adults, *A. funestus* may be considered to be about 16 times as "domestic" as some non-myzomyia anophelines. Dr. Leeson's corresponding figures are as follows:—

	Larvæ.	Adults.
Anopheles funestus (M) ..	117	2,034
Anopheles, all other species	1,350	2,383

This makes *funestus* about 10 per cent. as "domestic" as these other species. The author, however, explains the low larval capture rate of *funestus,* like Malcolm MacGregor has, on the ground of a certain agility in this species in eluding capture.

C. S.

CATALOGUE OF INDIAN INSECTS. PART XVIII. "CARABIDÆ."—By H. E. Andrewes. Calcutta: Government of India, Central Publication Branch, 1930. Pp. 389. Price, Rs. 8-10.

THIS catalogue will doubtless be of great value to zoologists and economic entomologists, but to the medical man its value is only slight. Beetles have very little direct medical or public health interest, but let us presume that a species has come within the purview of the medical man and been identified, then the catalogue aided by a good index will show all the synonyms and pseudonyms of the species, from what localities it has been previously taken, and will provide references to the literature.

There is nothing slipshod about the work, either on the part of the author or its publishers.

C. S.

"KHADYA" OR FOOD-STUFF, IN BENGALI.—By Rai Bahadur Chunilal Bose, C.I.E., I.S.O., M.B., F.C.S. Fifth Edition. Revised and Enlarged. Published by Dr. J. P. Bose, M.B., F.C.S. (Lond.). Calcutta: Bedanta Press, 1930. Pp. 477. Price, Rs. 2.

THE book is one which has proved to be of immense value to the people of Bengal for whom it is intended. It is written in a charming style and presents the mature views of a brilliant and widely educated worker of this country. The author has spared no pains in elucidating the dietaries best suited for the people of the country. He has also brought to light the vitamin value of the various indigenous food-stuffs in this new edition. There is a chapter describing the methods of preparation of sick diet. The book is strongly recommended to the public.

S. B.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. COLLECTED ADDRESSES AND LABORATORY STUDIES. VOL. V. 1928-29.—Compiled by John F. C. Haslam and Edited by R. T. Leiper, London. Illustrated.

As usual, the staff of the London School are to be congratulated on their output of work for the year covered by this volume of collected reprints. Of the 56 papers included in the volume 10 are statistical, 7 bacteriological, 5 protozoological, 21 helminthological, 7 entomological, 1 physiological and 5 general. Almost all have originally appeared in well-known publications, and will have been seen by specialist workers in the various journals they regularly study. The probable exception is Dr. Haslam's most able study of "Schistosomiasis and Malaria in Relation to Irrigation," which is an Empire Marketing Board Pamphlet. This is of outstanding interest and importance, and yet runs far too serious a risk of being completely overlooked by medical workers.

A paper which has greatly amused us is Professor Greenwood's "The Study of Industrial Hygiene," in which, rightly, he has torn to pieces an International Labour Bureau brochure on the special diseases associated with laundrying; this should serve as a lesson to all interested in industrial diseases, how not to go about it.

Leiper's "Landmarks in Medical Helminthology" will fill a great want as a good introduction to a very scattered subject, nomenclature in which is as historically interesting, and as controversially complicated, as it is in entomology.

The remaining papers are too specialized for general criticism in these columns.

Though it would doubtless add to the cost of publication, we think that reference to the volume would be greatly facilitated by continuous pagination, instead of numbering each reprint from unity, and reference back to the contents pages. As each reprint has been re-numbered from unity, and not left with the original journal pagination, this should not be very difficult.*

R. S. W.

THE PATHOLOGY OF DIABETES MELLITUS.—By S. Warren, M.D. London: Baillière, Tindall and Cox. Pp. xi plus 212. Illustrated with 83 engravings and 2 coloured plates. Price, 21s. net.

WE welcome Dr. Warren's book not only because it presents that side of a subject which is essential for the successful study of the problem of diabetes, but also because it contains a record of the results of his very useful and interesting hard work during very many years. Though fresh evidence is accumulating every day in support of the fundamental morphological observations made by pioneer workers like Opie, Allen, and others, that the *beta* cells of the islands of Langerhans have a very close relationship with the sugar metabolism, yet the absolute proof of the fact that lesions of the *beta* cells are the cause of diabetes

* (This suggestion is not feasible.—ED., *I. M. G.*)

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mellitus is not yet complete. To enable one to solve the problem whether the degree of severity of diabetes mellitus in any way depends on the quantitative lesions of the *beta* cells, one has to examine the human pancreas during life and immediately after death, before bacterial invasion takes place, which is likely to destroy the evidence of finer details, such as the presence or absence of granules in the cells.

Dr. Warren's book merits special recommendation by reason of the fact that it has attempted to deal with the pathology of both the living and the non-living in cases of true diabetes and non-diabetes. Its conclusions are based on biopsies as well as autopsies. The author has not only made use of post-mortem materials from cases of true diabetes mellitus, but has made special study and use of diabetic tissues removed surgically during life. For control tests, he has used materials from non-diabetics, cases of renal glycosuria, hæmochromatosis and glycosuria secondary to pituitary disorders. In all these, the author has made a careful study not only of the pancreatic lesions, such as qualitative and quantitative variations of the lesions in the islands of Langerhans (e.g., hyaline changes, fibrosis, hydropic degeneration, etc.), but what is after all vitally important, namely, the tissue-changes (secondary to diabetes) in other organs, such as, the liver, the spleen and the reticulo-endothelial system, the kidneys, the skin, etc., have also been very carefully dealt with by him.

Chapter VII, dealing with the pathology of acidosis and coma, though very short, is quite lucid, and so is the next chapter dealing with the ætiology and pathology of arterio-sclerosis.

The book is profusely illustrated.

We have no doubt that the book will prove to be of great value to those who take up diabetes as a post-graduate study.

J. P. B.

THE PATHOLOGY OF INTERNAL DISEASES.—By William Boyd, M.D., M.R.C.P. (Ed.), Dipl. Psych., F.R.S.C. London: Henry Kimpton, 1931. Pp. 888 plus xvi, with 298 illustrations. Price, 45s. net.

THIS book is an attempt, and a very successful one, to bridge over the gap that has tended to appear between pathology and medicine. The average text-book on the practice of medicine, adequately though it may deal with symptomatology, diagnosis, prognosis, and treatment, does not delve very deeply into the underlying pathology of the disease process. The equally average reader, his pathological vista "seen thro' a glass, darkly," is then left with the uncomfortable feeling that he really does not know the intimate cause of the various signs and symptoms of a particular disease. The way in which the volume under review attempts to remedy this defect is best described by quoting from the preface—"These pages," says the author, "are devoted to pathological matters but *the relation of symptoms to lesions* concludes the discussion of every subject of major importance." Dr. Boyd has, we think, every reason to feel proud of his work; the reviewer's lot is not always a particularly happy one but this is certainly one of these all-too-rare books the reading of which is a pleasant relaxation rather than an irksome duty.

There is little that calls for comment. The section on acute bacterial infections of the lungs contains a full account of all the work on the typing of pneumococci. In this connection it is of interest to note that the author makes a complete breakaway from the time-honoured classification of pneumonia; in the light of the modern advances in the serology of this disease he is certainly justified in considering it on the basis of bacteriology rather than morbid histology. Under the heading multiple sclerosis mention is made of the now highly controversial work of Miss Chevassut. It was with a feeling almost of disappointment that we beheld Dr. Boyd adding yet another term to our vocabulary on the reticulo-endothelial system, viz., littoral cells. We had hoped that our collection was complete.

There are very few errors of any consequence. At p. 68 line 20 the context suggests aortic stenosis not mitral stenosis. While we do not deny the possibility, we have been trying in vain to picture a heart weighing 52 lbs. (p. 89). Amaurotic family idiocy is not generally known as Tay-Sacks' disease.

The publishers have played their part well—the photographic reproductions are excellent and printing and binding leave nothing to be desired. It is all the more unfortunate, therefore, that in our copy pages 545—560 have been inserted twice and that as a consequence pages 529—544 are missing.

J. M. H.

RESEARCHES IN BRITISH GUIANA (1926—1928) ON THE BACTERIAL COMPLICATIONS OF FILARIASIS AND THE ENDEMIC NEPHRITIS, WITH A CHAPTER ON EPIDEMIC ABSCESS AND CELLULITIS IN ST. KITTS, BRITISH WEST INDIES.—By A. W. Grace, M.B., and Feiga Berman Grace. (No. 3 of the Memoir Series of the London School of Hygiene and Tropical Medicine, March 1931.) Published by The London School of Hygiene and Tropical Medicine, London. Pp. viii plus 75. Illustrated.

RESEARCHES in British Guiana (1926—28) on the bacterial complications of filariasis and the endemic nephritis is the title of the third volume of the memoir series of the London School of Hygiene and Tropical Medicine. This volume embodies the results of the investigations of Dr. A. W. Grace and Miss Feiga Berman Grace in British Guiana and the West Indies undertaken at the instance of the Council of the Royal Society and with the co-operation of the London School of Tropical Medicine. The report consists of three parts, the first being a general report on the filariasis investigations, the second a paper dealing in detail with the properties of the organisms isolated and the third a report on the endemic nephritis of British Guiana, to which Dr. W. G. Barnard has contributed a description of the morbid histology of specimens collected by Dr. Grace from fatal cases. It is interesting to find that filarial researches carried out by the Calcutta School of Tropical Medicine confirm to a large extent the results and conclusions arrived at by Dr. Grace and similar workers all over the world, so much so that it may be taken as fairly axiomatic that lymphangitis and other manifestations of *Filaria bancrofti* are due to secondary organisms. Experience of investigators in India differs from those in British Guiana in this respect, that while Dr. Grace concludes from evidence before him that the exciting cause of all attacks of lymphangitis in British Guiana is practically in every case the hæmolytic streptococcus, investigations in India point to the conclusion that though in the majority of cases the organism is the streptococcus there are other organisms, such as *Staphylococcus albus, aureus,* and *mollis, B. morgani, B. asiaticus,* and *B. pseudo-carolinus,* which are found to be associated with the disease.

It was held by some medical observers in the West that nephritis was due to *Filaria bancrofti* and this view gained a good deal of currency. It is comforting to find that Dr. Grace's conclusions coincide with those of the workers in the Calcutta School of Tropical Medicine in holding that there is a good deal of confusion on this subject, and that nephritis, as such, is not due to filarial infection.

The medical world is greatly indebted to the investigators who have collected valuable material in this field of enquiry.

S. S. R.

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Extract from the Medical Journal of Australia, October 4, 1930.

(The Official Journal of the B.M.A. in Australia.)

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OFFICIAL HISTORY OF THE AUSTRALIAN ARMY MEDICAL SERVICES, 1914—1918. Edited by Colonel A. G. Butler, D.S.O., V.D., B.A., M.B., Ch.B. (Camb.), A.A.M.C. Vol. I. Published by Australian War Memorial, Post Box 214d, Melbourne, 1930. Pp. xxvi plus 873, with 228 illustrations. Price, 21s. 6d. net (per volume).

THE Australian Army Medical Corps served in such widely separated areas during the Great War, that it has apparently been found necessary to divide the account of its varied activities into several sections each written by a different author. The volume under review contains three sections, viz.: (1) The record of the A.A.M.C. in Egypt and Gallipoli. (2) The Palestine campaign with administrative matters in Egypt subsequent to the Gallipoli campaign. (3) The capture and occupation of German New Guinea.

Section three, which comes at the end of the book, is really the first portion of the history of the Australian Imperial Force, for this small campaign began and ended before the larger force came into being. The capture of the islands included under the title of German New Guinea was accomplished almost in a few days so the record of this expedition is necessarily very brief and gave little scope for extensive medical organisation. The more important fact was the subsequent organisation of a force of occupation which after the cessation of hostilities in Europe handed over to an Australian administrative service under a mandate from the League of Nations, and a special chapter is devoted to this part of the work.

Section one occupies over two-thirds of the volume and it begins with an interesting outline of the growth of the Australian Army Medical Service from the earliest times in Australia up to the end of 1915, by which time it had become a very large and important body. From the time of the arrival of the first Australian Division in Egypt until after the evacuation of Gallipoli a great deal of confusion and misunderstanding appears to have existed. This was because it was the first time in the history of the British Empire that a large force under a separate government for its pay and promotions, etc., was placed at the disposal of the Empire and under military control of the War Office. As there was no precedent for an occurrence of this nature a system of administration had to be gradually evolved, and this was naturally not done without many mistakes and alterations before a working scheme was produced. Other sources of confusion were the apparent impossibility of clearly dividing the lines of demarcation between the commands of the Mediterranean Expeditionary Force, the command in Egypt and the necessary overlapping between the army and the navy. This greatly hampered the medical service in the evacuation of the sick and wounded, as well as returning to duty men who were again fit for the front. From this it will be seen that a clear and connected account of this campaign is an impossible task, and Colonel Butler has succeeded remarkably well in describing the many difficulties that beset the Australian Army Medical Service during this period, and in giving an unbiased account of its internal and external troubles in the first year of its existence.

Section two deals with the Palestine campaign which was a fairly straightforward operation and which only began after the inter-relations between the Imperial and Australian authorities were more or less well defined, so it is much easier to follow than is the account of the Gallipoli campaign. Also, on account of the rapid movement of troops over a wide area, many parts of this section read more like a story of adventure than of a dry historical record. This was largely a campaign in sandy desert necessitating the evacuation of sick and wounded over long stretches of sand, and many ingenious improvisations were devised to meet the conditions.

An interesting account is given of the successful manner in which epidemics of cholera and malaria were held in check, and, although the claim is not made by the author of this section, who was in charge of the medical service of the desert mounted corps, it is clear that had these two diseases not been successfully controlled the ultimate military success of this campaign would have been extremely doubtful. The book is profusely illustrated by photographs taken at the time of the events described, and there are several useful appendices.

P. A. M.

PIERSOL'S HUMAN ANATOMY: INCLUDING STRUCTURE AND DEVELOPMENT AND PRACTICAL CONSIDERATIONS.—Revised under the supervision of G. C. Huber, M.D., Sc.D. Ninth Edition. London: J. B. Lippincott Company, 1930. Pp. xx plus 2104, with 1,734 illustrations of which 1,522 are original and 460 are in colour. Price, Rs. 33-12. Obtainable from Butterworth and Co. (India), Ltd., Calcutta.

THIS being the ninth edition of this well-known book on anatomy it is obviously unnecessary to enter into a detailed account of its special features. After a few introductory sections on such subjects as "early development" and "elementary tissues," the division of the subject is made according to systems, the skeletal, muscular, vascular and so on. A very large number of clear illustrations are given in the text. Colour has been used wherever its introduction was likely to add to the clarity of the illustration. The descriptions given in the text are straightforward and easy to understand.

Anatomy as a subject does not undergo much change so that extensive revision is seldom necessary. In this instance the revision has consisted mainly in the introduction of a uniform B. N. A. nomenclature; this has been introduced throughout, usually to the total exclusion of the old nomenclature. The time has now come to drop the old nomenclature entirely. The period of metamorphosis, from the old to the new nomenclature, has been an extremely painful one for the medical student. Unfortunately, surgical books have lagged behind in this matter. A few years ago the student had to learn an entirely new language when he passed out of the anatomy rooms, but even the surgeon is now coming into line.

The two thousand odd pages form a very unwieldy volume, but perhaps this is not a matter of great importance. Division into a number of smaller volumes would add considerably to the expense. For a book of its size and quality the price is very reasonable.

DEVELOPMENTAL ANATOMY: A TEXTBOOK AND LABORATORY MANUAL OF EMBRYOLOGY.—By Leslie Brainerd Arey. Second Edition. Reset. Philadelphia and London: W. B. Saunders Company, Ltd., 1930. Pp. ix plus 563, with 532 illustrations. Many in colour. Price, 27s. 6d. net.

THIS volume is now in its second edition, and gives very clearly and concisely the developmental changes that take place in the embryo from fertilisation to maturity in the uterus. The book is well illustrated, and the few coloured plates are very well done.

The book is divided into three sections; part I deals with the general development of the ovum and its membranes, describes the formation of twins, and discusses the causation and different types of conjoined twins. Part II describes in detail first the developmental changes that take place in the formation of entodermal structures, and next those in the ectodermal structures, such as the skin, central nervous system and the sensory organs. Part III is more interesting for the advanced student, as it gives the technique used and the different appearances seen in the study of embryology. The account and study starts with the embryo chick, its incubation and development during the first day and up till the fourth day. The second line of study is that of the pig embryo, of varying size from six millimetres up to 32 millimetres. The book can be thoroughly recommended as it gives a very clear and concise

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account of the embryological changes that take place in the ovum after fertilisation.

H. W. A.

BAILLIERE'S SYNTHETIC ANATOMY. PARTS VII and VIII. (THE THORAX AND THE ABDOMEN.) —By J. E. Cheesman. London: Baillière, Tindall and Cox. Price, 3s. net, each part.

As the earlier sections have been reviewed in this journal, readers will probably be familiar with this series. The principle is a series of coloured transparent sheets which are superimposed on one another; on these the different structures are shown layer by layer. The object is not so much to replace dissection but to provide the student with an easy way of revisualising it.

The idea is a very sound one, and should be of especial value in this country where climatic conditions do not encourage the student to linger for long over the cadaver.

Parts VII and VIII—the thorax and the abdomen—of Baillière's "Synthetic Anatomy" are published together, as several plates in each are designed by interlocking to form the complete trunk. In order that this might be possible, part VIII is bound along the lower edge, and the cover and plates can, therefore, be turned downwards out of the way.

The survey of the body in this anatomy, in the antero- and postero-lateral aspects, is now complete, the only parts remaining to be published being the brain, and male and female perineum, which are dealt with from above and below.

THE NAGPUR SEWAGE DISPOSAL EXPERIMENT. REPORT.—By G. B. Williams, and F. C. Temple, Chartered Civil and Consulting Engineers, Tower House, Chowringhee Square, Calcutta. December 11th, 1930. Published by Thacker, Spink and Co., Calcutta. Price, Rs. 3.

THIS is an important and exceedingly interesting report of an experimental investigation carried out at Nagpur in order to decide what method of purification should be adopted for the sewage of Nagpur City from the points of view of initial cost, efficiency and cost of maintenance.

Nagpur has a population of 155,000 at present and the dry weather sewage flow is a million gallons per day. In 20 years' time it is estimated that about 3½ millions of sewage will be dealt with. At present the dry weather flow is partly treated on a sewage farm; in the rains, the sewage is not treated at all. The sewage is a very strong one and shows a figure of from 6 to 115 oxygen-absorbed parts per 100,000. The average figure is 35.4 about three times the figure for ordinary domestic sewage in England. The experimental plant was designed to treat the sewage in three ways, (*a*) by a septic tank, (*b*) by the Activated Sludge Company's process, (*c*) by the Simplex method. The effluents were utilised for irrigation and an estimate made of the value of the sludge for manurial purposes. The effluent from the septic tank was offensive, but could be dealt with on land in the dry weather. The effluents from the activated sludge and the Simplex processes were both clear, inoffensive and non-putrescible. The Simplex process gave better results when the sludge was re-aerated, either by the Simplex or the activated sludge mechanism. The activated sludge process seems to have given very little trouble in clogging which has been found to be difficult in other installations in India. The sludge from this process was of good quality and settled quickly; in the Simplex system it was greyish and more flocculent—it was evidently infected with fungus. The report sums up the result of the experiment in favour of one or other of these bio-aeration processes as being much superior to the "septic tank plus irrigation" system. The septic tank effluent is offensive and requires a great deal of careful treatment on land to make it suitable for final discharge into a river.

The costs of the activated sludge and Simplex systems work out extraordinarily similar the initial cost of both being about Rs. 5,00,000, and the maintenance costs Rs. 30,000 per annum. The authors of the report insist strongly on the manurial value of the sludge in both these processes and state that as drying offers no difficulty in India the sale of the sludge (which is estimated at Rs. 15 per ton) should repay amply the initial cost of the installation. The estimated output of sludge is 5,600 tons per annum. The authors give no final opinion as to which system they would recommend, as both seem to offer advantages; from the body of the report it would appear that the activated sludge process gave superior results so far as the physical character of the sludge was concerned. The report is a valuable contribution to the study of sewage disposal in India.

A. D. S.

AMONG THE THINKERS.—By J. A. Lindsay, M.A., M.D., F.R.C.P. London: H. K. Lewis and Co., Ltd., 1931. Pp. ix plus 197. Price, 5s. net.

THIS book is written by a medical man but it is by no means written for medical men alone; there are in fact no sections which are not equally suitable for the lawyer or the merchant. It consists of a series of quotations from thinkers, as the title suggests, of all nations and of all periods. Aristotle, Confucius, Spinosa, Goethe and H. G. Wells are amongst the thinkers, and the subjects on which they have thought include conduct of life, education, history, science, art, style, manners, women, and work.

Some of the quotations from foreign writers are in English, others are in the original. One wonders why. The obvious answer is that some of the sayings would lose too much by translation, but there is no reason to suppose that this has been the criterion in every case. In order that a prospective reader may not be frightened off we will tell him straightaway that both Confucius and Turgenev have been translated, and that Aristotle and Pythagoras speak more frequently in English than in their mother tongue.

One quotation will particularly appeal to research workers. "Discovery consists in three stages. The first stage is of laborious work at the problem on all sides; the next is not one of conscious occupation with the subject but of unconscious cerebration, during which a promising hypothesis may unexpectedly arise in the mind; the third is of deliberate verification and completion of form."

The reviewer has always suspected that Mr. Punch's advice, "Don't," to those about to get married, was not entirely original; "When in doubt restrain thyself" was said by Pythagoras some thousands of years earlier.

We can recommend the book for reading at odd moments, on the way to a consultation, for example, or whilst waiting for a meal. It will be much more improving to the mind than the daily paper, for instance, the important bits of which you have probably read before.

L. E. N.

Annual Reports.

BENGAL PUBLIC HEALTH REPORT. By DR. C. A. BENTLEY, C.I.E., M.B., D.P.H., D.T.M.&H., DIRECTOR OF PUBLIC HEALTH, BENGAL. REPORTS OF THE BENGAL SANITARY BOARD, AND THE CHIEF ENGINEER, PUBLIC HEALTH DEPARTMENT FOR THE YEAR 1929. CALCUTTA: BENGAL SECRETARIAT BOOK DEPOT, 1930. PRICE, Re. 1.

THIS is the last public health report which will bear Dr. Bentley's signature, and the Government of Bengal in their resolution rightly draw attention to the services that Dr. Bentley has rendered to the progress of public

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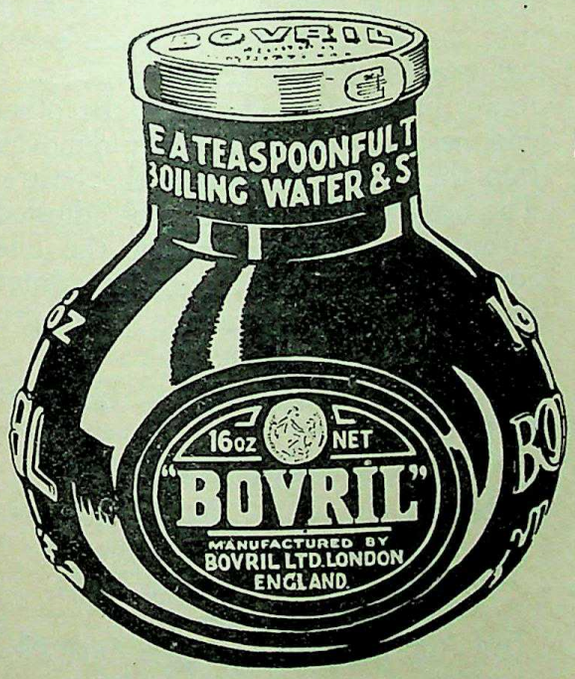

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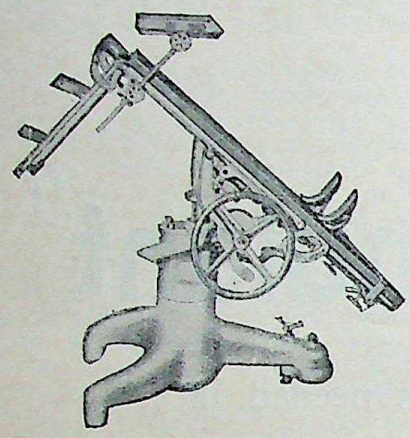

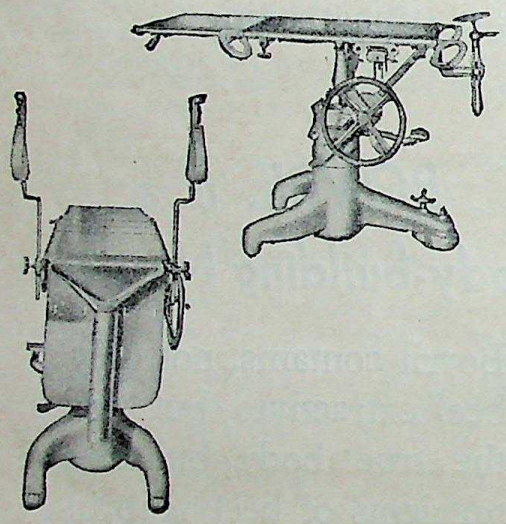

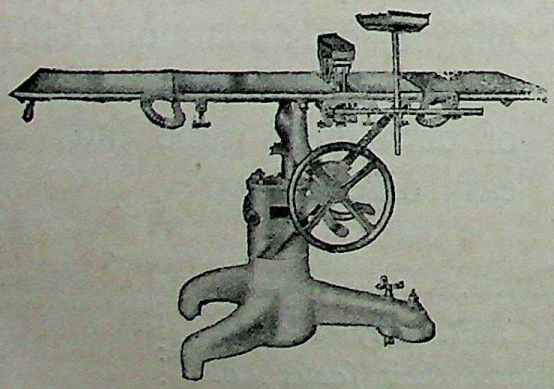

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health in Bengal by his administration and by his excellent series of reports on the health of Bengal for the last 16 years. In these reports, Dr. Bentley has used the graphic method of representation freely so that the general public could obtain a general appreciation of facts about vital happenings without reading tables or masses of figures. The trend of birth and death rates for instance, the seasonal incidence of small-pox, malaria and cholera, the averages of these diseases for several years compared with the year under reference; all such matters could be easily grasped from year to year by a glance at the graphs in the report.

The report opens with a map showing the activities of public health agencies in Bengal. All districts have health officers, a good proportion of municipalities have health officers, and sanitary inspectors, while the Rural Health Circles are increasing every year. There are still a large number of municipalities which evade their responsibilities in the matter of sanitary inspectors, however.

Vital occurrences.—The trend of both death rate and birth rate is now definitely downwards in Bengal, the birth rate tending to decrease at a greater rate than the death rate; the average natural increase is therefore getting less. It is interesting to note however that the districts round the southern and the western perimeter of the province show a birth rate in 1929 above the 10 years' average, while the central districts of the province (Jessore, Nadia, Rajshahi, Pabna and Dinajpur) show an excess of deaths over births. The seasonal birth rate remains the same, the number of births being largest in December and January and lowest in June, July and August.

Deaths.—The death rates at each age period are well shown in a diagram. The healthiest age period in Bengal is the 10th to 15th year though the death rates at this period (7.4 per 1,000 males and 8.0 per 1,000 females) are much in excess of those in England and Wales where they are about 2 per 1,000. The infantile mortality rate was 179.9, a slight increase over 1928. The correctness of these rates depends entirely on the correctness of registration, and it is interesting to note that at age periods below one month and between 1 and 6 months the infant mortality rates have been steadily increasing while between 6 and 12 months they have steadily been on the decline. Calcutta shows the highest infantile mortality rate (260), and Noakhali the lowest (124). The trend of infantile mortality in Bengal as a whole is distinctly downwards.

Seasonal mortality.—In Bengal, the highest mortality occurs in December and January and the lowest during the hot weather and monsoon months.

Cholera declined in 1929 causing 81,090 deaths and a death rate of 1.7 compared with one of 2.5 per 1,000 in 1928. Cholera caused 7.4 per cent. of the provincial mortality. During 1927, 1928, and 1929 cholera has been more prevalent in Bengal than for many years. This was part of a widespread pandemic affecting many countries of the East and apparently associated with the cyclical return of an "epidemic constitution" (climatic and other conditions) favouring the recurrence of widespread epidemics of cholera. Cholera retains its peculiar seasonal distribution in Bengal having two peaks of maximum incidence in April and December. In 1929 the April peak was much higher than the December peak, possibly owing to an extensive campaign of cholera inoculation, as the winter months is the season when many people take protective inoculation. During 1929, 1,718,610 c.cms. of anti-cholera vaccine were issued and 1,566,150 inoculations were reported as having been done in the districts. Disinfection of water supplies is extensively carried out, and inoculation centres were opened at various centres for inoculation of pilgrims going to various fairs and *melas*. Dr. B. B. Brahmachari working under the Indian Research Fund Association did some interesting work on the epidemiology of Bengal cholera. He found that in about 23 per cent. of epidemic centres the disease recurred year after year and that the freedom from cholera in the area under observation (150 square miles) was mostly very short, though in some instances, such freedom was up to 27 weeks. He found (1) that in one thana vibrios were found in 12.5 per cent. of 2,734 healthy persons examined, (2) that practically all these (97 per cent.) were of the non-agglutinating type, and (3) that in the off season (June to October) all vibrios found were non-agglutinating, as were also the vibrios found in cases suffering from choleraic symptoms. The non-agglutinating vibrios occasionally became agglutinable in the course of sub-culture. Agglutinating vibrios easily lost this property during sub-culture. Human carriers of non-agglutinating vibrios rose and fell with the cholera incidence. This suggests that the non-agglutinating vibrio is the form assumed by the vibrio during the off season, and that these types tend to pass into the agglutinating type during the epidemic season. What is the effect of widespread mass inoculation of human beings on the vibrios? Is it to convert it quickly into the non-agglutinating type? If so, it might explain the disappearance of cholera in Java after widespread inoculation.

Small-pox.—This caused 20,407 deaths, a mortality of 0.7 per 1,000. Chittagong and Dacca showed the highest figures.

Fevers.—As usual fevers gave the highest figures of mortality, the death rate being 15.3 per 1,000 from this group. Malaria provided by far the highest returns, but the number of undifferentiated fever deaths is about the same as malaria. The highest numbers of fever deaths are in the cold weather, the lowest in the hot and monsoon months.

Malaria.—The Rajshahi and the Presidency and Burdwan Divisions gave the highest returns. Central Bengal is intensely malarious, Western Bengal less so, while Eastern Bengal is much less affected. Fever indices in the various divisions have declined, however, very distinctly since 1921.

The *Kala-azar Research Laboratory* turned out some useful work during the year. *Anopheles philippinensis* was found infected in nature during the year.

In the districts, anti-malarial work is being carried on by District and Union Boards, and by voluntary societies, working either independently or in conjunction with Union Boards. Cleaning tanks, filling up ditches and *dhobas*, and kerosinisation, are the main features of their work, along with the distribution of quinine and cinchona. 10,820 deaths from kala-azar were reported, against 10,746 in 1928. Rajshahi, Nadia and Jessore showed the highest figures. Bankura, Midnapur, Birbhum and Chittagong were practically free of the disease.

It is interesting to note that the number of deaths recorded from enteric fever, 10,487, is practically equal to that from kala-azar.

Relapsing fever still continues to account for a large number of deaths (4,000). There is reason to believe that these are really cases of ordinary malaria and not really relapsing fever, which is rare in Bengal except in the hills.

There was no death from plague in 1929 in Bengal. Dysentery and diarrhœa accounted for 37,156 deaths. The seasonal incidence of intestinal diseases is interesting, the minimum occurring in June. Howrah and Calcutta as usual recorded the highest figures.

Respiratory diseases.—52,843 deaths were due to this class of disease accounting for 1.1 per 1,000 of the total mortality. The cold weather shows the largest mortality. Influenza accounted for 3,000 deaths, pneumonia for 23,500 and phthisis for 11,000. Respiratory diseases are a serious factor of mortality all over India. Phthisis in Calcutta accounts for 2.4 deaths per 1,000. The rural death rates from this disease are about 0.17 on the average. Darjeeling showed the high rate of 3 per 1,000; the remainder are between 0.04 and 1, but possibly many of these are incorrectly so low.

Snake-bites.—The months of July and August are the time of greatest numbers of snake-bites. 105 cases were reported as having been treated in the province.

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"Other causes" represent a death rate of 3.6 per 1,000 out of the total mortality of 23.5 per 1,000.

In the Asansol mining settlement for which a special sanitary health board exists, there is a disquieting rise in the infant mortality rate which was 149 in 1929, as against 139 the previous year. 128 deaths occurred from cholera in the collieries, and 518 in the mining board area.

In the *Bengal Public Health Laboratory* a large amount of analytical work was done. In food samples, there was an increase of 43.9 per cent. in the number of samples examined. The percentage of adulterated food-stuffs averaged about 40 per cent. Useful and interesting research work was carried out on water and food subjects. The Dacca Public Health Laboratory carried out a large amount of routine analytical work.

The *Bengal Vaccine Laboratory* produced 2,000,000 c.cms. of vaccine lymph.

School hygiene and dai training were carried out by special officers of the department during the year.

The publicity department reports a large amount of very useful propaganda work done during the year. It assisted the Eastern Bengal exhibition train in providing a health section; more than 400,000 leaflets were distributed.

There is an interesting account of the activities of the *Vaccination Department* during the year.

5½ million vaccinations were done in Bengal during 1929, being an increase of 250,000 over 1928. Bengal records by far the highest number of vaccinations per 1,000 of the population, with the exception of Assam. It is interesting to note that no case of post-vaccinal encephalitis has been reported.

Municipal expenditure on sanitation.—Rs. 2-12 is the average amount spent per head in Bengal municipalities for sanitary work, of which Re. 1-10-6 is devoted to conservancy. The expenditure on real public health measures is comparatively negligible. 4,089 Union Boards worked during the year as against 3,005 the previous year.

The usual appendices giving details of vital statistics in the various districts are given.

ANNUAL REPORT OF THE HEALTH DEPARTMENT OF SINGAPORE MUNICIPALITY, FOR 1929. By P. S. HUNTER, M.A., M.B., Ch.B., D.P.H., MUNICIPAL HEALTH OFFICER, SINGAPORE. PRINTED BY C. A. RIBEIRO & COMPANY, GOVERNMENT PRINTERS.

THE name "Singapore" suggests two diseases, beri-beri and malaria, and one naturally turns to the sections of this report dealing with these diseases. Dr. Hunter's notes on beri-beri are extremely interesting. Beri-beri is reported to have caused 701 deaths. Dr. Hunter states: "The more I study this disease the more difficult I find it to accept these figures as correct, if by beri-beri a purely deficiency disease is understood. The race and age distribution are rather against a purely deficiency disease for it occurs mostly in adult Chinese of working age. They, of all the Asiatic races, when they have money to spend, are inclined to spend it on adjuncts to their ordinary dietary. And again why should we have one diet deficiency disease so prevalent when rickets, another deficiency disease, is comparatively rare, and that too in the face of conditions of feeding and dietary that must inevitably result in the production of rickets in a temperate climate"?

The superintendent of Tan Tock Sen Hospital, we believe, considers that "Dry beri-beri may be in many instances of syphilitic origin." There is evidently much to be brought to light regarding the syndrome at present classified as beri-beri.

Dr. Hunter and his deputy Dr. Dawson have had a long and varied experience of Malayan malaria and its prevention, and their opinions must carry great weight. Malaria in Singapore has two carriers only, *Anopheles maculatus* and *ludlowii*. The former has been to a large extent literally "laid low" by extensive drainage, open and subsoil, of the numerous ravines which constitute the chief source of seepages. The *A. ludlowii* problem, however, has not been so easy to tackle and still constitutes a serious menace in many parts of the town. Low-lying swamps along the sea front are the seats of breeding. So long as such places are washed daily by tides, they are apparently free from danger, but outlying swamps reached only by an occasional tide are dangerous. The practice hitherto found most successful has been to cut off such areas from tidal flow and fill them in with earth so that the subsoil water is permanently below ground level. This has proved successful, but is very expensive and needs large capital sums. Lately, endeavours have been made to cut off tidal influences so as to reduce the salinity of the pools below the optimum salinity for *A. ludlowii*.

During the year tidal gates were constructed on the Sungei Whampoa at Serangoon Road, the purpose being to prevent the free access of sea water to the many acres of low-lying swamp adjoining the river. This experiment is being undertaken to see if it is possible by this means to prevent or certainly to limit the large amount of *ludlowii* breeding which is known to take place in this area.

Before the gates were in operation, a series of 100 samples of water were taken from selected ponds and pools. The nature and variety of mosquitoes breeding in these were noted, while the samples were tested for percentage of sea water. This percentage was found to vary from 0.04 to as high as 83.4. *A. ludlowii* was found breeding in the latter sample, but it was also breeding in a sample with as low a percentage of sea water as 0.9. Since the gates were closed, regular monthly samples from the same selected points have been collected and examined. The salinity has already considerably decreased and so, too, has the amount of *ludlowii* breeding; this latter may, of course, be purely seasonal and no conclusions can therefore be drawn until observations have been made for at least a year.

This experiment is interesting, as in India *A. ludlowii* has been found breeding profusely in very low percentages of salinity, even as low as 0.02.

In the Singapore water works on the mainland, extensive anti-*maculatus* work was designed and carried out by Dr. Hunter some years ago. There is still some malaria amongst the workers there and the interesting observation has been made that the *A. maculatus* will breed along with stegomyia in places like old biscuit tins and galvanised iron tanks; as Dr. Hunter remarks, this is a tribute to the anti-*maculatus* work, but disconcerting, as such breeding undoubtedly caused an outbreak of malaria.

The whole amount spent on anti-malarial work in the year was $145,000.

There are some other interesting points in the report. The birth rate of Singapore was 36.59 per 1,000, the death rate 26.31, and the infantile death rate 197.5 per 1,000 births.

It is interesting to note that the infantile death rate is falling, and this fall is associated with a steadily rising birth rate. Amongst the Malayans the rate is 292, amongst the Chinese 191 and in the Indians 171. Malayan mothers are less approachable, more superstitious, and less amenable to modern teaching than the Chinese. Convulsions accounted for 1,248 deaths in children and Dr. Hunter on investigation found that many of these were probably due to diphtheria. There were 1,080 deaths ascribed to malaria in Singapore during the year, but of these many were external to the town.

The death rate of 26.31 is the lowest yet recorded. It is determined on an estimated mean annual population calculated on the 1911 and 1921 censuses. The birth rate of 36.59 is also the highest yet recorded. Singapore town presents the unusual phenomena of a rising birth rate, a falling death rate, and a falling infantile mortality rate, tributes to its prosperity and to its progressive public health measures. Child welfare work is up to date and progressive. A full-time lady medical officer is in charge of this work, which is carried

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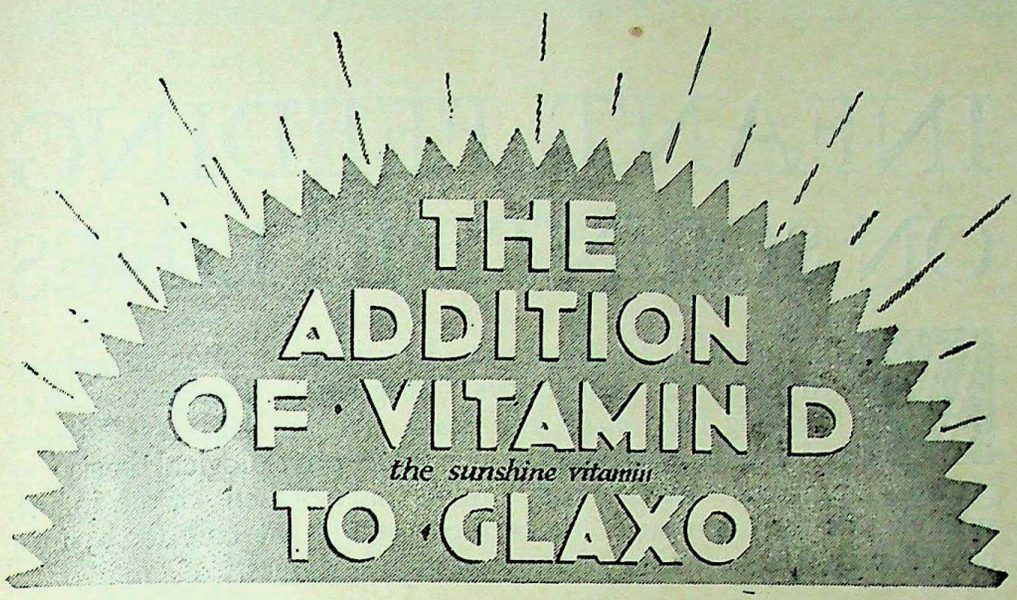

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out through municipal and child-welfare society clinics. Midwives must be registered, and it is estimated that 82 per cent. of mothers received some skilled attention at the births of their children.

The report also describes the activities of the public health department in relation to the supervision of eating houses, slaughter houses, offensive trades, and burial grounds. Altogether it is an interesting report of a very live, progressive, and efficient department.

Correspondence.

NOVASUROL AND SALYRGAN.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have just read Dr. R. C. Majumdar's paper* recounting his experience of Novasurol in cases of ascites which he says is superior to the Ayurvedic preparation which goes by the name of "Swarna patpaty." I have used Novasurol extensively and have had some failures and in a few cases adverse symptoms, although the drug was administered with great care, in small doses, and at intervals of about a week. I have for some time now been giving a trial to Salyrgan (Hoechst) and find it better in every way than Novasurol, Merbapen, and similar mercurials. Moreover, I have not observed any adverse symptoms following the administration of this synthetic chemical as has occurred with others I have used, and I certainly think it a safer preparation. I have under my care at the moment a man of about 45 years of age suffering from ascites with œdema of the whole body and in particular of the external genitals, retention of urine, and obstipation. One injection of 0.5 cm. of Salyrgan reduced his œdema more than 50 per cent. and caused free diuresis, and loose stools. I am giving him ammonium chloride by the mouth as well. When I was first called to see this patient, about ten days ago, I informed his relatives that he was beyond hope of recovery, as he was suffering from cardiac œdema with polyserositis.—Yours, etc.,

A. F. W. DA COSTA, F.R.C.S., D.T.M., L.M.S.,
Civil Surgeon, Bilaspur.

21*st May,* 1931.

RHEUMATIC FEVER IN THE TROPICS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In your issue of February 1930, there was an article by Lieutenant-Colonel H. Stott, entitled "On rheumatic infection as a cause of mitral stenosis among young Indians." Does acute rheumatism affect Indians?

It seems quite clear that rheumatic fever does attack some natives of India in some places, but what Indians and in what part of India is not mentioned in that article.

There are many different races and many different climates in India. About three-fifths of India is outside the tropics and, unfortunately, the term India is often used as though it were synonymous with the word tropics.

Lieutenant-Colonel Stott seems to be writing of the Central Provinces which are not in the tropics.

I have expressed the opinion that rheumatic fever does not occur in the tropics and it would be interesting to know in what part of India true rheumatic fever is found.

No race is known to be immune to rheumatic fever. The Mongolians and the Bantus do not get the disease in the tropics but, when living in temperate climates, they succumb.

Cases occurring within 2 or 3 degrees of the edge of the tropics would hardly refute my statement as in many places near the tropical limit the climate can not be described as typically tropical. Calcutta for instance is climatically exceptional.

It seems to me that the essential environments of rheumatic fever are:—

(1) The common rat flea of temperate climates, *Ceratophyllus fasciatus* which is not a normal denizen of the tropics, though it is possible that it may be found in ports or places to which the brown rat has spread.

(2) The common brown rat, *Rattus norvegicus.* This rat is not a normal denizen of the tropics, though it may now be found in some of the larger ports or along great trunk highways.

(3) The broken house drain leading to the sewer, of which there is very little at present in the tropics.

In my opinion the origin of rheumatic fever will be found to be connected with one or more of these things.

I have been informed that there is no rheumatic fever in Persia, and that the brown rat is not found in that country. The climatic conditions of Persia are not very suitable for the flea *Ceratophyllus fasciatus,* and it may be presumed that the country has not yet instituted water-borne sewage systems.

Fleas and rats do not readily pass high mountain ranges. Persia is not a tropical country but for certain reasons it has none of what I regard as the essential environments of the disease.—Yours, etc.,

J. T. CLARK,
Late Health Officer and Medical Officer, Perak, Federated Malay States.

ARCOT,
ASHBURNHAM AVENUE,
HARROW,
2*nd April,* 1931.

[The Central Provinces are almost entirely in the tropics. Dr. Clark must have meant the United Provinces.—EDITOR, *I. M. G.*]

LENGTH OF LIFE OF ANCYLOSTOMA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

DEAR SIR,—I shall be thankful if any of your readers, especially those who are engaged on research on the subject, will kindly enlighten me on the following points:—

(1) What is the average life of a hookworm, *Ancylostoma duodenale* or *Necator americanus?*

(2) What can happen to an untreated person who has got a very mild infection of hookworm and who is not exposed to further infection? Evidently he is not liable to automatic re-infection, as in the case of thread worm infection.—Yours, etc.,

N. N. GHOSH, M.B., D.T.M.,
Teacher, Dacca Medical School.

199, MITFORD ROAD,
DACCA,
10*th April,* 1931.

[Dr. A. C. Chandler (*Indian Journ. Med. Res.,* XIII, 625) carried out an investigation on the length of life of the hookworm. He found that 50 per cent. of jail residents lost their hookworm infection within three months, 70 per cent. within a year, and 80 per cent. within two years.

Dr. Maplestone (*Indian Journ. Med. Res.,* XVIII, 685) by taking individual prisoners in the same jail has shown that although there is a decrease in the hookworm egg count during part of the year there is an increase at another time. He discovered that, although there was little chance of re-infection in the jail itself, the prisoners sometimes worked outside the jail. This, he contended, would lead to the falsification of Dr. Chandler's conclusions. He thinks that the apparent delay in the loss of the infection for as long as two years in Dr. Chandler's series is due to the occurrence of re-infection.

*Novasurol in the Treatment of Ascites. *Indian Med. Gaz.,* LXVI, 266.

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The point has not, therefore, been settled, but Dr. Maplestone appears to be of the opinion that the length of the life of a hookworm is shorter than Dr. Chandler's figures suggest.

There is, however, no question about self-infection; this cannot possibly occur in the case of ancylostoma infection.—EDITOR, *I. M. G.*]

DIATHERMY IN PNEUMONIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

DEAR SIR,—I shall be much obliged if any of your numerous readers will kindly enlighten me through your journal about the usefulness of diathermy in pneumonia cases, and if anybody has first-hand knowledge about this type of treatment. Thanking you.—Yours, etc.,

N. N. DAS, B.A., L.M.S.

167, RUSSA ROAD,
BHOWANIPUR,
CALCUTTA,
20th April, 1931.

DIFFERENCE IN AXILLARY TEMPERATURE ON THE TWO SIDES.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the course of my practice I happened to see a case having a difference of 1°F. between the temperatures in the axillæ—the temperature in the right axilla was 96.8°F. and in the left 97.8°F. The person was quite well; there were no signs in the lungs, but there was chronic enlargement of both the tonsils. I could not find any difference in the two sides except that there was a faint mark of chronic ringworm in the left axilla.

Will any of your readers suggest a reason for this variation of temperature?—Yours, etc.,

R. S. GARGA, M.S.M.F.

RAMNAGAR,
UNITED PROVINCES,
6th April, 1931.

"THE ELIXIR OF LIFE."

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the *Statesman* of Sunday, the 27th April, 1930, under the heading "The Elixir of Life" I read the description of a plant, *Hydrocotile asiatica,* that delays old age and about its other valuable medicinal properties. Since then I have been searching various quarters to ascertain the identity and the Hindustani name of this plant but have remained unsuccessful. May I request your favour of kindly helping me by giving its vernacular Hindi or Urdu name and that of the place wherefrom this plant can be got? Is any preparation made from it for use as medicine in this or any foreign country? If so, wherefrom is it available? A kind reply on the above will highly oblige. I am a layman and will not be able to understand technical language, if used in reply.

Thanking you in anticipation.—Yours, etc.,

RAO BIRJ RAJ SARAN SINGH, M.B.E.

GANGA BHAWAN,
DAMPIER NAGAR,
MUTTRA, U. P.,
19th April, 1931.

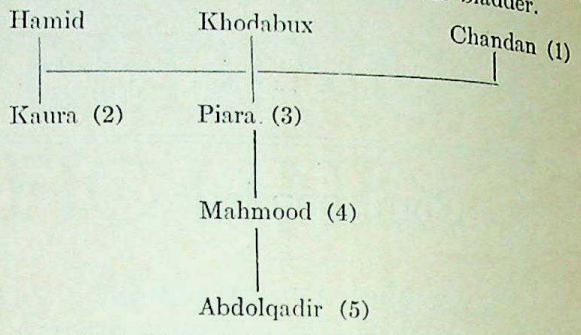
[*Note.*—We have referred this question to Capt. De, the officiating Professor of Pharmacology, who has kindly given us the following information:—

The Hindi name of the plant *Hydrocotyle asiatica* is "Brahmamanduki" or "Brahmi." The Bengali name is "Thalkuri." It is distributed throughout India and is obtainable from every locality almost all the year round. We are not aware of any preparation made from *Hydrocotyle asiatica* being used in Western Medicine.—EDITOR, *I. M. G.*]

INHERITED STONE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Herewith I send you a table showing five members of a family having stone in the bladder.



Dera Gazi Khan district is very hot and dry with a very low rainfall. Also all are meat and egg eaters.—Yours, etc.,

RUDR DUTT,
Assistant Surgeon.

DERA GAZI KHAN,
PUNJAB,
24th April, 1931.

HILUM TUBERCULOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Dr. R. N. Tandon, in the March issue of the *Indian Medical Gazette,* has attempted to establish the frequency of hilum tuberculosis amongst Indians, in my opinion, on insufficient grounds.

There have been great differences of opinion in the medical profession about this condition. There are two schools of thought—one school believing in it, the other denying the existence of any such condition.

Dr. Wingfield asserts that hilum tuberculosis "is by no means the myth that some would have us suppose." Morristone Davies is of opinion that the commonest and earliest seat of infection is not the apical region but the hilum. Clive Riviere strongly advocates hilum tuberculosis as a separate variety of the disease.

On the other hand, Dr. Burrell warns us against considering dense and exaggerated hilar shadows to be due to tuberculosis. He says, "Tuberculosis starts in the lung and spreads from there; it does not start in the glands at the root and spread into the lung." Sir Douglas Powell and Sir P. Hartley "doubt the soundness of the view that tuberculosis spreads continuously outwards from foci at the hilum" and in their opinion "Hilum tuberculosis is an unnecessary addition to nomenclature." Sir James Kingston Fowler condemns the use of the term hilum tuberculosis which, to him, "Is a 'shadow' first seen in a darkened room and not yet clearly recognised in the daylight of the post-mortem room."

It would appear that the existence or otherwise of the condition depends upon the interpretation put upon the word "hilum."

Anatomically speaking, the hilum consists of structures which go to make up the root of the lung, namely, the pulmonary artery and veins, the bronchi and bronchial vessels, the lymphatic vessels and glands, the pulmonary plexuses and the connective tissue which surrounds these structures.

That hilar glands may be enlarged and of tuberculous origin cannot be denied and in the absence of an obvious lung lesion, they may constitute true hilum tuberculosis but this is not the form of the disease to which the term is applied.

The use of the term came into fashion with the introduction of *x*-rays in the diagnosis of pulmonary tuberculosis. Some radiologists, believing that every pathological process in the lungs could be recognised on the plates, began to regard all increased hilar shadows as evidence of tuberculosis. Having thus

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Stypticin solution 10 %, in ampoules of 1 c.c., boxes of 5.

For local application:

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assumed that the hilum is the primary cause of tuberculosis, they tried to explain the involvement of the outlying portions of the lungs by means of peribronchial centrifugal extension.

This conception of hilum tuberculosis would appear to be based on the slenderest evidence and founded on misinterpretation of the root-shadows. It has not been supported pathologically and clinically. The mistake was recognised later on by radiologists and in the opinion of Wessler and Jaches, "to regard these shadows as evidence of the involvement of the lung-root in a tuberculous infiltration is fatal to a rational interpretation of the plates; a large percentage of mankind would then be pronounced as clinically tuberculous and the Röntgen diagnosis would be reduced to absurdity." It is also worth mentioning here that Sante, in the *Annals of Röntgenology*, does not even make mention of hilum tuberculosis; while Melville considers it a heresy on the part of radiologists to admit its existence.

It will not be out of place to mention here that hilar glands form the third element of what is known as the "primary-complex of von Ranke"—the other two elements being the "primary focus" in the lung when the tubercle bacillus enters the body by inhalation, and the "lymph vessels" which drain the lymph from the primary focus to hilar glands. It was Parrot who showed for the first time the connection between the lung tissue and the hilar glands when he said that "the glands were like a mirror of the lungs," meaning that there could be no inflammation of glands at the hilum without a pulmonary origin.

It must not be forgotten that considerable exaggeration of hilar shadows may exist without any enlargement of the glands. It is possible also for hilar glands to suppurate and produce infection of the lung-parenchyma by direct contiguity; but then this is not hilum tuberculosis in the sense in which the term was originally employed.

Some radiologists try to explain the presence of hilum tuberculosis by including the adjacent portion of the lung parenchyma as a part of the hilar shadow. This again is a faulty way of explaining the condition.

From what has been said above, it would appear that increase in hilar shadows is of little value in diagnosis. In the vast majority of cases, particularly in adults, the changes that are discovered at the roots have very little or no clinical significance and, aside from noting their presence, they are better ignored.—Yours, etc.,

Y. G. SHRIKHANDÉ, B.SC., M.B., B.S., T.D.D. (Wales).

KING EDWARD VII SANATORIUM,
BHOWALI, U. P.,
6th April, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

MAJOR-GENERAL H. BOULTON, C.B., C.B.E., V.H.S., has been appointed Honorary Surgeon to the King, *vice* Major-General F. H. G. Hutchinson, C.I.E. (retired), 28th October, 1930.

Colonel C. W. F. Melville has been appointed Honorary Physician to the King, *vice* Brevet-Colonel S. R. Christophers, C.I.E., O.B.E. (retired), 27th November, 1930.

Lieutenant-Colonel J. P. Cameron, C.I.E., has been appointed as Inspector-General of Civil Hospitals and Prisons, Assam, with effect from the 27th April, 1931.

The services of the undermentioned officers have been placed permanently at the disposal of the Punjab Government, with effect from the dates noted against their names.

Major S. N. Hayes, 7th November, 1926.
Lieutenant-Colonel B. Gale, 1st January, 1928.
Major Hari Chand, M.C., 3rd June, 1928.
Major Jamal-ud-din, 10th November, 1928.
Major K. R. Batra, 20th October, 1930.

Major R. L. Vance has been appointed substantively as an Agency Surgeon under the Government of India in the Foreign and Political Department, with effect from the 29th April, 1931.

Major H. Williamson, O.B.E., has been posted as Civil Surgeon, Quetta, with effect from the 30th April, 1931.

Major J. G. Bird has been posted as Civil Surgeon, Sibi, with effect from the 29th April, 1931.

Major S. S. Sokhey, Assistant Director, Haffkine Institute, is appointed, until relieved by Major L. A. P. Anderson, to officiate as Director, Haffkine Institute, *vice* Brevet-Colonel F. P. Mackie, O.B.E., K.H.S., whose services have been placed at the disposal of the Government of India.

Captain John Acheson has been appointed to the Indian Medical Service on probation, with effect from the 30th April, 1928, with seniority from the 25th June, 1927.

Lieutenant N. L. Sah has been appointed to a temporary Commission in the Indian Medical Service, with effect from the 9th May, 1931.

Bhagat Ram Tandon has been appointed as Captain (Provl.), with effect from the 25th August, 1930 (with seniority from 25th August, 1924).

The following officers have been appointed as Lieutenants (on probation), with effect from the 25th August, 1930:—

Jaswant Rai Dogra.
Sarup Narain.

Venkatachari Srinivasan has been appointed as Lieutenant, with effect from the 25th August, 1930 (with seniority from the 25th August, 1929).

PROMOTIONS.

Brevet-Colonel R. McCarrison, C.I.E., K.H.P. (Supy.), was promoted to the rank of Colonel, with effect from the 5th November, 1929, with seniority from the 1st January, 1922.

Lieutenant-Colonel F. E. Wilson has been promoted to the rank of Colonel, with effect from the 16th September, 1930.

Captain J. R. Katariya has been promoted to the rank of Major, with effect from the 16th April, 1931.

Lieutenant J. P. J. Little has been promoted to the rank of Captain, with effect from the 30th April, 1931.

Lieutenant J. S. McMillan has been promoted to the rank of Captain (Provl.), with effect from the 12th March, 1931.

RETIREMENT.

Colonel G. Hutcheson has retired from the Service from the 15th February, 1931.

LEAVE.

Lieutenant-Colonel R. Knowles, Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, is allowed leave from the 15th July, 1931, to the 14th October, 1931.

Major R. L. Vance has been granted leave for 18 months, with effect from the 30th April, 1931.

Notes.

KAL-DERMIC.

MESSRS. DAVIS AND GECK, of New York, the makers of the well-known "D. & G." surgical sutures have just offered to the profession a new ideal suture for skin and tension work. The need for such a product has long been recognized and Kal-Dermic (which is the brand name) is offered as a result of exhaustive experimental work by the Davis and Geck organization.

Hospitals throughout the world use "D. & G." sterile sutures. The Davis and Geck organization specializes

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exclusively in surgical sutures. The "D. & G." output exceeds several lakhs of tubes daily.

Kal-Dermic skin sutures are made of catgut as distinct from silk-worm gut or horse hair; they are non-capillary, and are unusually flexible; they are strong, resistant to tissue fluids, non-irritating and uniform in size. Their distinctive blue colour is stable, making the sutures readily discernible in the tissues.

They are sterilized by heat and are unaffected by age, climate or light. The exteriors of the tubes may be sterilized either by boiling or by the use of any active germicidal solution.

Its distributors are The Bombay Surgical Co., New Charni Road, Bombay.

VENTRICULIN.

VENTRICULIN is a substance which has been proved to be of very definite value in the treatment of pernicious anæmia. The following notes have been provided by the Parke, Davis' agency in India:—

The presence of an anti-anæmic substance in stomach tissue was demonstrated by the collaborative studies of Sharp, of the Parke, Davis and Co. Department of Experimental Medicine (*Journal of the American Medical Association*, September 7th, 1929), and Sturgis and Isaacs, of the Thomas Henry Simpson Memorial Institute for Medical Research, University of Michigan (*ibid.*). The stomach extract now offered to the medical profession by Parke, Davis and Co. is called Ventriculin, from the Latin word ventriculus, meaning stomach. It is a dry, granular, palatable substance, capable of producing a rapid and effective remission in Addison's anæmia. Every lot of Ventriculin released for distribution is first clinically tested and approved by the Simpson Memorial Institute of the University of Michigan.

As soon as the diagnosis of pernicious anæmia is made, treatment should be begun with Ventriculin, the daily dose of which will depend upon the red-cell count. If the count is less than 2,000,000 per cubic millimetre, the dose will be four measuring-capfuls (40 grams): if 2,000,000, three capfuls; if 3,000,000, two capfuls; and if 4,000,000, one capful. The dose should be placed in a half-glass of fruit or tomato juice, stirred for three to five minutes, and taken in this form; or it can be mixed with cooked cereals or other food, being intrinsically palatable. It is *not* soluble in water or other liquids.

Any dosage that does not come up to the clinical requirements will, of necessity, delay the process of blood-regeneration; so there is really no economy in making the beginning doses smaller than as specified in the preceding paragraph.

The primary stimulation of young red-cell proliferation takes place during the first fifteen days of treatment, after which time only adult red cells appear. The initial dosage should be continued until the red-blood-cell count is normal—which usually requires six to eight weeks, depending upon the level of the count prior to medication.

Minot and his associates observed a slight decrease in the red-blood-cell count preceding the reticulocytosis induced by the administration of effective anti-anæmic substances in primary anæmia. Since the signs of erythropoiesis rarely occur before the treatment with Ventriculin has continued for four to seven days, the interpolation of a negative phase in this period must be properly interpreted.

After the red-blood-cell count has reached normal it is probable that the amount of Ventriculin necessary to maintain the blood at this level will be not more than one measuring-capful (10 grams) five to seven times a week. Since Ventriculin probably replaces a substance which is lacking in a patient with pernicious anæmia, its use may have to be continued indefinitely.

A general physical improvement, subjective and objective, is usually evident within a few days after commencing treatment. Nausea and vomiting subside rapidly. Appetite, so frequently impaired, improves steadily, and it is not uncommon for the patient to awaken at night hungry and desiring additional food. Gain in weight is to be expected if a well-balanced diet accompanies the treatment.

Ventriculin will not cause a return of free hydrochloric acid in the stomach. Many of these patients have atrophy of the gastric mucosa, and in many, if not all, a congenital or acquired achlorhydria preceded the anæmia.

Ventriculin cannot be expected to promote rapid improvement in long-standing and extensive subacute combined degenerative lesions of the spinal cord. The neural manifestations may be alleviated indirectly by improvement in the general physical condition, but this response is not comparable with the beneficial changes in the hæmatologic findings.

In a case of severe relapse the dosage should be not less than four measuring-capfuls (40 grams) daily, in order to obtain the best response from the blood-forming organs.

NEOTROPIN.

NEOTROPIN, one of the new genito-urinary antiseptics, is a derivative of a dye of the pyridine series. A high bactericidal action *in vivo* is claimed for it. In the words of the manufacturers, "It has been clinically proved that Neotropin has a large field of action, but gonorrhœal affections form a particularly suitable field with very gratifying results." The value of Neotropin in the treatment of this infection lies in the fact that with no other therapeutic agent is it possible to gain so thorough a control over the prostatic recesses, vesiculæ, etc., which are so often the seat of chronic diseases.

The dosage which is advocated is two dragées three times a day. This may be continued for a week or more, but in prolonged treatment it is better to interpose a pause of a few days between each week of treatment. The administration of Neotropin should invariably be continued for several days after the complete subsidence of the symptoms and signs, in order to avoid relapses.

By reducing the intake of fluids during Neotropin therapy a remarkable bactericidal effect may be obtained with quite small doses. On the other hand, should the case appear to require it, there need be no hesitation in increasing the dose to nine dragées daily.

The dose is reduced in the usual way for children, and in patients who are liable to gastro-intestinal upsets it is advisable to begin with somewhat smaller doses.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

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Original Articles.

FURTHER OBSERVATIONS ON HEART DISEASE IN THE PUNJAB.

By T. A. HUGHES, M.A., M.D., M.R.C.P., D.P.H.,
LIEUTENANT-COLONEL, I.M.S.,
Professor of Clinical Medicine, K. E. Medical College, Lahore,

and

MOHAMMAD YUSUF, M.D.,
Clinical Assistant to the Professor of Clinical Medicine, K. E. Medical College, Lahore.

IN an earlier paper (Hughes and Yusuf, 1930) attention was drawn to the fact that in the Punjab rheumatism is an important cause of valvular heart disease, especially of mitral stenosis. Although the rheumatic condition seems to be most frequent in pubescents and young adults, it generally resembles in its manifestations the rheumatic fever of children in temperate climates. Acute arthritis is seldom seen, the disease usually taking a sub-acute or chronic course with a strong tendency to relapse. In some cases with typical heart lesions the history indicates little or no involvement of the joints and in these the cardiac condition is generally either discovered in course of routine examination or escapes detection until compensation begins to fail. The joints most frequently attacked are the ankles, knees, wrists, elbows and small joints of the hands and feet, but almost any joint in the body may be affected. In the more acute cases especially, the disease first appears in one or two joints and spreads to others a day or two later. We have not seen rheumatic nodules or chorea in any patient but tonsilitis is sometimes present. An analysis was given of 24 cases of valvular disease in all of which except one the mitral valve was damaged; the exception was that of a patient with syphilitic aortitis. In 16 there was evidence of stenosis, in 4 of incompetence and in 3 of "double mitral" disease. The aortic and mitral valves were affected in 4 cases. Thirteen patients gave a history of having suffered from painful swollen joints and five had multiple arthritis on admission. *X*-rays were used in the diagnosis of mitral stenosis in some cases with equivocal physical signs. Skiagrams were taken at a distance of six feet so as to eliminate distortion. The diagnostic features are prominence of the pulmonary artery and occasionally of the left auricle in the antero-posterior position, and enlargement of the left auricle in the right anterior oblique position.

In the same communication we described 11 cases of disease of the heart in which there were no signs of valvular injury and no history of rheumatism. All the patients came under observation on account of cardiac insufficiency of greater or less degree. In two there had been symptoms of coronary thrombosis and in one who died there was a large aneurysm of the apical part of the left ventricle. The Wassermann reaction was positive in two, but in one of these syphilis had been contracted only a year previously and was therefore not the cause of the heart disease. In the other there was a fair-sized aneurysm of the descending aorta. A third whose Wassermann was negative stated that he had acquired syphilis 15 years before. Electro-cardiographic evidence of myocardial disease was found in 7 of the 11 cases, *viz.*, auricular fibrillation (1), right branch bundle block (1), intraventricular block (2), widening and notching of the QRS complex (1), inversion of T_2 and T_3 (1) and prominence of Q_3 (1).

During the past year we have noticed some further features of heart disease among the patients admitted to the Mayo Hospital, Lahore, which we think are worthy of mention. The first is the occasional occurrence of uncomplicated aortic regurgitation of rheumatic origin. In a series of 21 cases of valvular disease there were two patients aged, respectively, 18 and 22 years with well-marked aortic incompetence who gave typical histories of rheumatism but who presented no evidence of a mitral lesion. The aortic leak in each case was detected in the course of routine examination, the patients having been admitted to hospital on account of lobar pneumonia and chronic malaria, respectively. Their ages excluded acquired syphilis as a cause of the valvular defect, as syphilitic aortitis occurs on an average 20 years after infection. Nor were there any symptoms or signs of congenital syphilis. The Wassermann reaction was negative in both. The blood pressures were 115/40 and 135/50. The diastolic murmurs were best heard at the left border of the sternum in the third intercostal space. Coombs (1930) points out that this is the usual site of maximum intensity in rheumatic cases, while in syphilitic cases the murmur is generally loudest in the so-called aortic area, the dilatation of the first part of the aorta, which often occurs in specific aortitis, facilitating the upward conduction of the murmur. In a third patient with pure aortic regurgitation syphilis was not so easily excluded. There was no history of joint trouble and the patient's age was 50. The Wassermann reaction was negative, but this is sometimes so in individuals with undoubted syphilitic disease of the aorta. The general characters of the case, however, were not in favour of a syphilitic origin. The systolic blood pressure was not high, *viz.*, 110/60, the murmur was best heard in the third left interspace at the edge of the sternum and there was no evidence of arterial disease or of syphilitic lesions outside the vascular system. We think it probable that the valvular condition

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was the result of a rheumatic infection which did not attack the joints.

Sub-acute bacterial endocarditis was seen in two cases with signs indicating disease of the mitral valve only.

One patient was a Hindu male aged 23 who was admitted on 7th October, 1930, with marked general weakness and right-sided hemiplegia which had come on suddenly four months previously. He had been ailing for nearly four years, the chief complaints being shortness of breath and palpitation on slight exertion. There was no history of rheumatism, venereal disease or any protracted illness. Emaciation was moderate but pallor was very marked. There was slight œdema of the feet and legs. The temperature ranged from 97° to 99°F. except on one occasion when it shot up to 102°F. The heart was moderately enlarged. There was an apical systolic thrill and a soft blowing apical systolic murmur which was conducted to the inferior angle of the left scapula. The second pulmonary sound was accentuated. The blood pressure was low, 90/60. The urine contained a moderate amount of albumin, large numbers of red blood cells, a few blood and epithelial casts, and several granular casts. The spleen was slightly enlarged. There was no evidence of superficial embolism. The Wassermann reaction was negative.

The patient died on 18th October, 1930. Post-mortem examination revealed rough, extensive, fungating vegetations on the mitral valve which was shrunken but not ulcerated. The other valves were healthy. There was a large area of softening beneath the Rolandic cortex on the left side. Old infarcts were present in the spleen, right lung and both kidneys.

The second patient was a Hindu male, aged 50, who came to hospital complaining of (1) irregular low fever, (2) palpitation and shortness of breath on slight exertion, and (3) pain and great tenderness in the calf of the left leg. The fever, palpitation and shortness of breath had been in existence for 2 years while the pain in the leg had suddenly started 5 days previously. The patient had had an attack of sub-acute rheumatism lasting one month, 8 years before. While in hospital the temperature kept subnormal for 10 days and then began to rise to 99°F. in the afternoons. There was marked clubbing of the fingers and incurving of the finger nails. The middle of the calf of the left leg remained extremely tender. The heart was moderately enlarged. There was an apical systolic thrill and a soft apical systolic murmur which was conducted to the inferior angle of the left scapula. The second pulmonary sound was accentuated. The blood pressure was 120/80. The liver was enlarged four finger-breadths below the costal margin. The urine contained a small amount of albumin but no red blood cells. The Wassermann reaction was negative and a blood culture yielded no organisms.

The post-mortem findings in the first case and the history and physical signs in the second indicate the probability that in both these patients the infective endocarditis was grafted on to the ordinary rheumatic lesions.

The electro-cardiograph gave evidence of myocardial involvement in 3 cases of rheumatic endocarditis with good compensation. They all showed the same abnormality, *viz.*, inversion of T_2 and T_3. In one of them (an Anglo-Indian) these waves became inverted during the febrile stage of a sub-acute attack of rheumatic fever implicating the right shoulder, elbow and wrist. At first there was some enlargement of the left ventricle with a soft apical systolic murmur and reduplication of the second sound at the apex. After about two months the heart reverted to normal size and the murmur and reduplication disappeared. T_2 and T_3, however, remained inverted. In the other two cases there were no joint symptoms at the time of examination. T_3 alone was inverted in 4 instances, but this feature is often seen in perfectly normal individuals and does not necessarily signify myocardial disease. Involvement of the heart muscle is to be expected in the rheumatic cases in view of the strong tendency of rheumatic fever in temperate climates to damage the myocardium, especially in children.

Observations on 18 cases of non-valvular disease whose ages ranged from 26 to 60 revealed some points of interest. There was no history of rheumatism in any of these patients. The degree of cardiac insufficiency present at the time of admission to hospital varied from complete breakdown of the circulation to moderate curtailment of everyday activities. The symptoms were often more marked than the physical signs. The commonest indications of myocardial weakness were shortness of breath, cyanosis, œdema and palpitation. In some cases with considerable enlargement of the heart a soft mitral systolic murmur indicative of relative mitral incompetence was present. One patient had had an attack of acute pulmonary œdema on the night preceding admission to hospital, in another the cardiac condition first came to notice on account of a sudden severe attack of dyspnœa which was followed by occasional anginal pains, and in a third the initial symptom was severe persistent substernal pain accompanied by the other features of infarction of the heart. In three patients the blood pressure was high and in one of these nocturnal dyspnœa was the chief complaint. One individual came to hospital on account of attacks of paroxysmal tachycardia lasting from a few minutes to several hours. The pulse rate during the attacks was 200–210. The electro-cardiogram showed the abnormal rhythm to have a ventricular origin and to be associated with a right branch bundle block. Four patients died

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but autopsies were permitted on two only. In one of these both lungs were found markedly emphysematous and in the upper lobe of the left lung there was a large infarct. The heart showed considerable dilatation of both ventricles but the coronary arteries were not diseased. In the other patient, who died of secondary broncho-pneumonia, the pericardium was completely adherent, the condition being part of a polyserositis. There was also profound anæmia. Both ventricles were hypertrophied and dilated.

Electro-cardiographic changes were present in all except three. In two the curves indicated right branch bundle block and in one of these, as already mentioned, there were attacks of ventricular tachycardia. In one patient auricular fibrillation and auriculo-ventricular block occurred together, the result being a slow irregular pulse. Other features were inversion of T_1, T_2 and T_3, of T_2 and T_3, and of T_1 and T_2, notching and widening of the QRS complex, prominence of Q_3, and the presence of "escaped" ventricular beats. Electro-cardiography is an important method of examination in such cases, especially when the symptoms are out of proportion to the physical signs.

The cause of myocardial disease in these patients is not at all clear. We do not consider syphilis to have been an ætiological agent in any one of them. No history of venereal infection could be elicited and the Wassermann reaction was negative in all. Further, none of the cases presented the characteristic features of syphilitic heart disease. As far as the heart and great vessels are concerned syphilis usually attacks the first part of the aorta, the aortic valves and the origins of the coronary arteries, and gives rise to aneurysm, dilatation of the aorta, angina of effort and aortic incompetence, usually with high systolic blood pressure and pronounced left ventricular hypertrophy. The heart muscle suffers chiefly from defective blood supply and not from direct syphilitic lesions. Although syphilis seems to be common in parts of the Punjab we have no reason to think that it is a frequent cause of heart disease in the province. In the majority of non-valvular cases seen by us a degenerative process involving the muscles, either directly or by causing disease of the coronary arteries, would appear to have been at work. What this is related to, it is at present difficult to say. It may be the result of previous infections, active focal sepsis, defective diet, etc., or it may be due to a combination of causes. That it is by no means confined to old people is shown by the fact that of the 18 patients mentioned above 7 were under 40 and 11 under 50 years of age.

Summary.

Instances are described of the following features of heart disease as seen in the Punjab:—

1. The occurrence of uncomplicated aortic regurgitation of rheumatic origin.
2. The occurrence of sub-acute bacterial endocarditis.
3. Electro-cardiographic evidence of myocardial involvement in rheumatic cases.
4. The prevalence in middle age of a "degenerative" type of non-valvular heart disease in the causation of which neither rheumatism nor syphilis seems to play any part.

Our thanks are due to Dr. D. L. Shrivastava who took the electro-cardiograms and to Dr. K. K. Jaswal, our house physician, for assistance during the investigation.

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THE MANIFESTATIONS OF CHRONIC YAWS.

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SINCE the publication by one of us (Dey, 1930) of a preliminary study of yaws in the Kamrup district of Assam, we have had the opportunity of investigating a further series of 400 cases in the same area and we offer the following observations in the hope that they will aid in the diagnosis of the often puzzling manifestations of this disease.

The standard works on tropical medicine lay great stress upon the florid secondary eruptions, which last for a comparatively short period, whilst the tertiary lesions, which tend to pursue a chronic course, and are infinitely more refractory to treatment are, as a rule, dismissed with the briefest reference. It is, of course, possible that in the localities where it has been chiefly studied, Ceylon, Haiti, Cochin China, the Gold Coast and Central Africa, the secondary eruptions are found in greater profusion than in the relatively temperate climate of Assam.* Be the explanation what it may, yaws as it is usually met with here, *i.e.*, in the adult who contracted the disease in childhood, bears scant resemblance to the clinical picture presented by most writers on the subject. It is, therefore, not improbable that it may be encountered in many other undeveloped parts of India where it has hitherto remained unrecognised.

Ramsay (1925) who saw 1,000 cases in the Cachar district of Assam was the first to note

* We hesitate to adopt the suggestion, put forward by Lieutenant-Colonel H. W. Acton in a recent paper on filariasis, that the bulk of observers have followed their cases for a short period only in the cooler months!

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the effect of altitude upon the lesions. Amongst the hill tribes condylomata in moist regions and a "chronic dermatitis" of the hands and feet were chiefly seen. (It had been previously held that yaws did not exist above 1,000 feet.) In the plains in the hot season the disease assumed its classic form, and a hill-man coming to a lower level developed lesions of this type, and in the plains during the cold weather the lesions came to resemble those seen in the hills throughout the year. These observations accord with our experience. Tertiary lesions he found to be rare, though commoner among the hill tribes.

history is one of an annual recrudescence from an early age, with almost complete freedom in the winter months save for joint or muscle pains and the hyperkeratosis of the hands and feet to be presently described.

Non-vegetating lesions we have found to be as common, if not more common, than vegetating ones; the fungating generalised frambœside is rare in adults and in not a few cases no history of such lesions having appeared can be elicited. In long-standing cases keloid formation of all degrees of severity is very often met with.

Fig. 1.—Secondary eruption on soles (healing). An ulcer can be seen near the right great toe.

Powell (1923) who observed yaws in Assam for 10½ years saw no tertiary lesions and, although he found plantar hyperkeratosis to be common, he did not believe it to be of yaws origin..

We on the contrary have found tertiary lesions to be relatively common.

Mukharji (1930) in describing yaws in Chittagong Hill Tracts makes no reference to tertiary lesions and Muir in his leprosy survey of Bihar found cases which had been mistaken for leprosy (Chopra, Gupta and Mullick, 1928).

A point of some interest is the extreme chronicity of the condition. In many, the

Yaws, then, as we meet it, bears somewhat the same relationship to the classic yaws of the textbooks, that syphilis in western Europe, among a population partially immune to the virus, does to that seen upon its first introduction to a virgin soil.

Let us now consider some of these conditions in more detail.

Clavus (Crab Yaws).

This term is of some vagueness, for under it would seem to be included two completely different conditions, *viz.*:—

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(*a*) Secondary eruptions on the soles, and (*b*) hyperkeratosis with cracking and undermined ulcers.

The first appears within a few months of the initial lesion and forms part of the general eruptive stage from which it in no way differs, though, owing to their position, the frambœsides readily break down and become open sores (figure 1).*

Somewhat later in the secondary stage, a condylomatous condition is seen between the toes, usually in children.

Hyperkeratosis.—This we found in 144 cases of our series (36 per cent.), 128 adults and 16 children under twelve. The average duration was seven years. Eleven cases only (7.7 per cent.) showed other active lesions and in these the hyperkeratosis was of two years' duration only.

Its essential feature is an overgrowth of the horny layer which sooner or later cracks in lines corresponding to the natural folds of the skin, exfoliation occurs, and the breaking down of tissue beneath the thickened epidermis gives rise to ulcers of considerable depth (figure 2). On the hands, the stages of the process can be observed in more detail, patches of hyperkeratosis can be seen irregularly distributed in all stages of desquamation, thin pale skin appearing when the epidermis has completely come away which as a rule remains permanently paler in colour. At the bends of the fingers cracks are seen penetrating between the folds of the thickened skin on the flexor aspect extending to the true skin and often breaking into linear ulcers, and a similar condition is noted on the palm. Sometimes a wide and roughly circular area on the palm bears a marked resemblance to ringworm (figure 3).

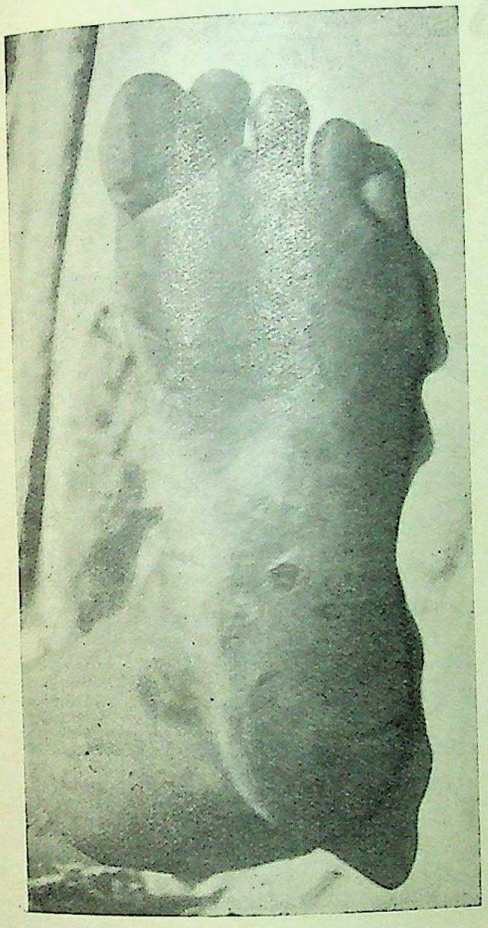

Fig. 2.—Hyperkeratosis; a perforating ulcer on the arch of the foot. Contrast with figure 1.

Fig. 3.—Ringworm-like distribution with patchy desquamation.

In performing a rapid survey of the population in an infected area *e.g.*, at fairs and markets) it is often useful to observe the skin around the back of the heel. This is seen to be unduly thickened and shows numbers of fine cracks extending slightly upwards around the sides. This is of great assistance in the diagnosis of latent cases.

A distinction must be made between this and the more widespread keratolysis plantare sulcatum recently described by Acton and McGuire

*These figures are probably not a fair sample of the affected population, as they were collected during the winter months, when the disability is least.

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(1930 and 1931). Both lead to great disability at the times when the agriculturist has to work in water for many hours daily. This latter, which is actinomycotic in origin, gives rise to large numbers of symmetrically-distributed pits, most marked at the heel and ball of the foot. When breaking down occurs, a mouse-eaten appearance results, quite unlike the flaky desquamation of yaws and, however far advanced the disintegration, a few pits can always be seen which determine the diagnosis. Mixed cases occur, though rarely.

Occasionally, a massive pad-like thickening of part of the sole is seen, which shows no tendency to break down but is nevertheless painful. The serum in these cases was negative and we presume it to be due to some actinomycotic infection.

Ringworm yaws.

There is a type of squamous framboeside which resembles tinea circinata so closely as to be indistinguishable from it otherwise than microscopically. A good example is shown in figure 4. In this case treatment by arsenicals caused almost complete disappearance of the lesions, the nature of which is thus proved. These lesions we have found in 1 per cent. of our cases. In one case this was the only lesion, nor could any history be elicited; the serum, however, was positive and the condition rapidly cleared up after treatment, leaving a temporarily-depigmented patch, which subsequently regained its normal pigmentation.

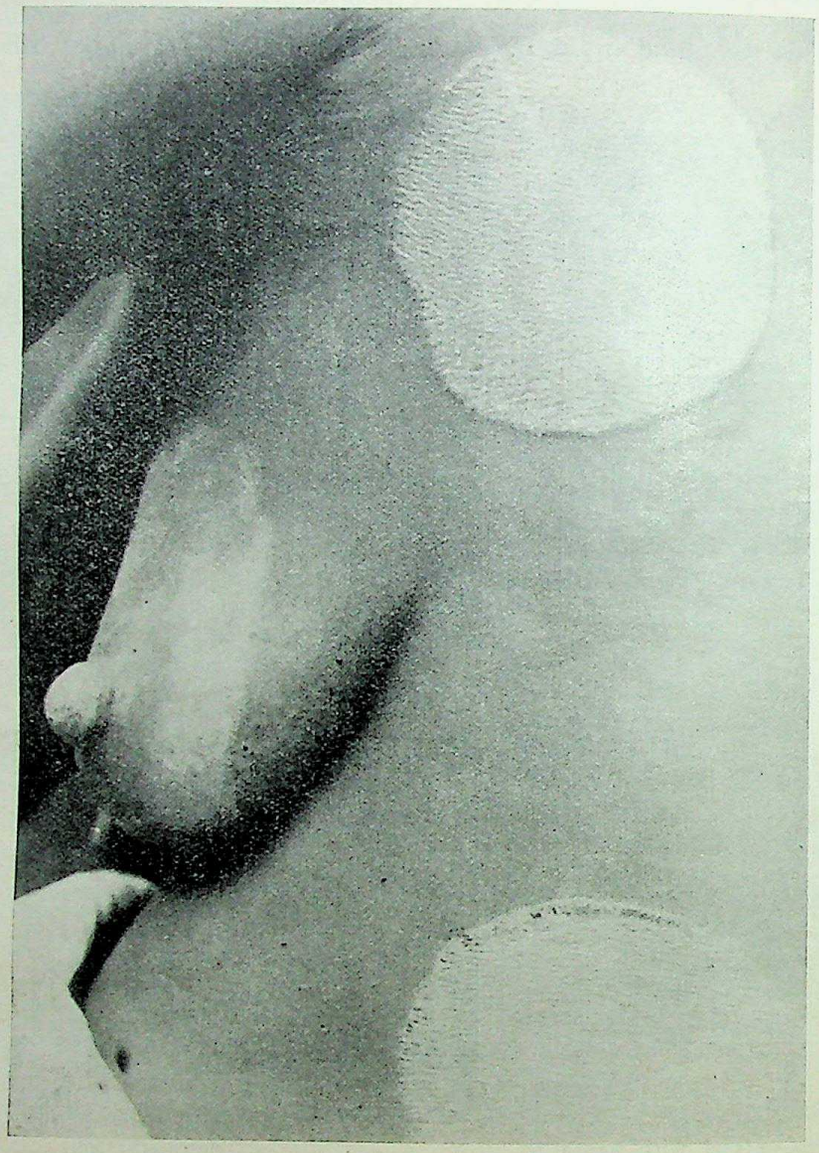

Fig. 4.—Ringworm yaws.

Large, ill-defined areas of a desquamating squamous eruption are common on the trunk and owing to their slight irritation are mistaken by patients for ringworm—a universal malady in Assam. Under treatment they disappear, sometimes after a single dose, leaving a wide area lighter than the surrounding skin.

Psoriasiform lesions.

Lesions with scale formation are often seen, the flexor aspect of the wrist, the extensor surface

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of the ankle and inner aspect of the thigh being common sites. They thus differ from psoriasis which favours especially the extensor surfaces, notably the elbows and knees, nor does bleeding occur when the scales are removed. On healing an area of darkened pigmented skin remains.

In lesions of long standing lichenisation occurs with much thickening and pigmentation.

In one instance we noted a papulo-vesicular eruption, distributed over two of the lower ribs and intercostal spaces, bearing a superficial resemblance to herpes zoster. The duration of the disease was eight months; there was a positive serological test. This also yielded readily to treatment leaving a pigmented scar.

Leucoderma.—This we found in 2 per cent. of our series but in another endemic area, where patients had received a small quantity of Stovarsol some time before, we were interested to note that the incidence was far higher.

Juxta-articular nodules.—These have been very fully described and are referred to here only because they are frequently seen in otherwise latent cases and are useful aids in diagnosis. They were found in 3.5 per cent. of this series. Goundou (a symmetrical enlargement of the nasal bones) is rare (0.75 per cent.) and gangosa has only once been seen.

Keloid conditions.

The hideous deformities resulting from untreated yaws do not receive adequate notice in most textbooks; massive keloid growths suggesting the sequelæ of a boiler explosion and covering half the trunk are sometimes seen; they constitute 2 per cent. of our series (figure 5). In others both upper and lower limbs are completely atrophied as a result of keloid growths, and the patient becomes a hopeless cripple. In one instance we were able to see the process at work.* Here it appeared that successive crops

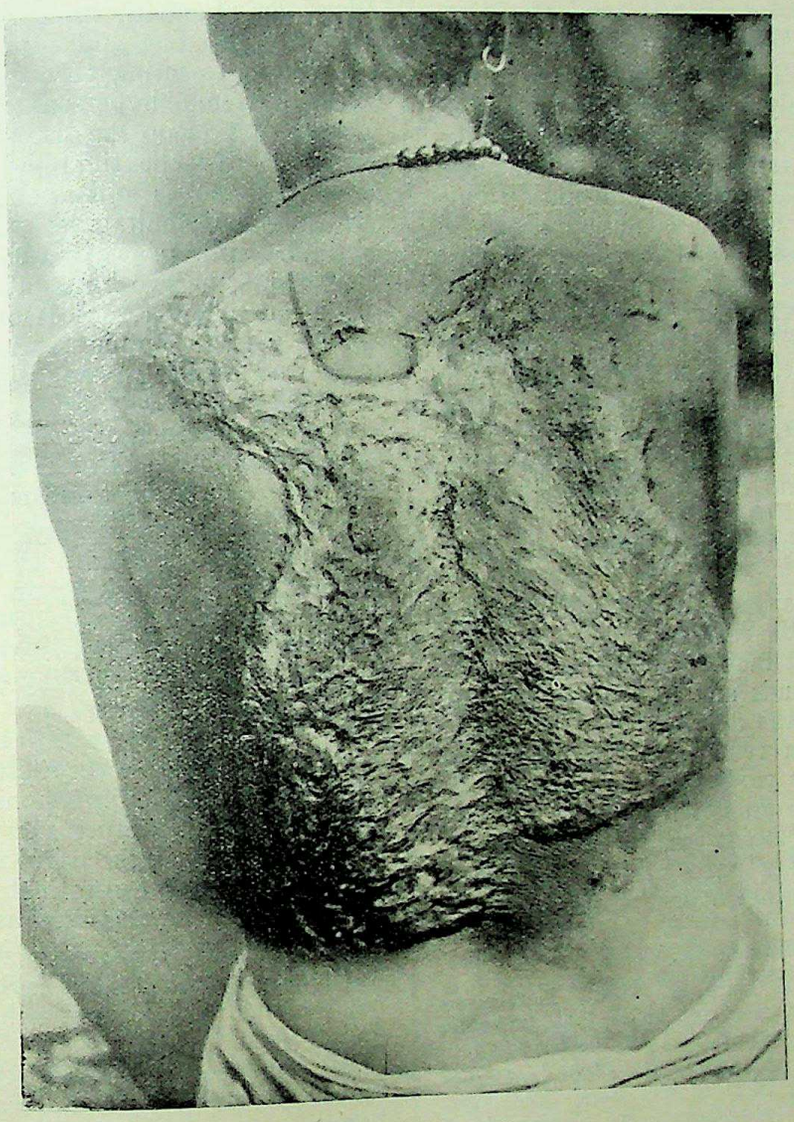

Fig. 5.—Keloid scarring.

* The photograph illustrating this was forwarded by the authors for reproduction, but as it has already been reproduced (figure 17) in the junior writer's previous paper (Dey, 1930) it was omitted. The reader is advised to refer to this paper as it contains a number of photographs illustrating some of the conditions referred to above.—Editor, *I. M. G.*

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of ulcers had enclosed the arms, gradually spreading upwards from wrist to shoulder and leaving in their wake scar tissue. The arms and legs are commonly flexed. At this stage, nothing can of course be done, though treatment improves the general health to a remarkable extent.

This condition bears little resemblance to anything seen in syphilis.

Keloid scarring, serpiginous or linear, frequently follows secondary ulceration in all situations and may sometimes be the only evidence of past yaws.

Bony lesions and tertiary ulcerations.

These we found in 8 per cent. of our series, they are considerably more common on the lower limbs, leading often to considerable deformity. The typical appearance is that of an indolent ulcer, resistant to cure. The differential diagnosis between this and the condition known as Naga sore is impossible apart from the history, though the patients are as a rule quite definite on the subject, referring to the latter as a "government sore" (*sirkari ghaw*), presumably for the reason that, like the Government, it is widespread. Naga sores tend, however, to break out during the rains, whilst tertiary yaws lesions are fairly constant. A diffuse periostitis of the long bones, ulna and tibia, is occasionally seen and also dactylitis (0.5 per cent.).

In two cases we have found yaws in combination with leprosy.

Summary.—Yaws in the Kamrup district, possibly for climatic reasons, tends to chronicity, its commonest manifestation being hyperkeratosis of the hands and feet, which subsides every year during the dry season.

In other cases a remarkable similarity has been noted between yaws and ringworm.

It is possible that greater familiarity with the signs of yaws in a latent condition will lead to its discovery in other parts of India where its existence has not hitherto been suspected.

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NOTES ON THE DIAGNOSIS AND TREATMENT OF ULCUS TROPICUM.

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THE diagnostic points are:—

(*a*) An acute-looking ulcer of long duration with deep and punched-out or undermined edges, an abundant discharge of glairy mucus with free bleeding and sometimes pearly islets, engorged, projecting through the base.

(*b*) Extreme hypersensitiveness and pain often radiating up the limbs and causing sleeplessness. (By the time the patient comes for treatment, he is quite unnerved. Even the very chronic small ulcer with a red spot the size of a split pea will cause a man sleepless nights and unnerve him. This is a very useful diagnostic point for it leads to the discovery of the causal organisms in apparently trivial ulcers and eliminates the diagnosis of the patient as neurotic.)

(*c*) The presence of *Spirochæta schaudinni* in smears made from the ulcer.

There seem to be three main types:—

(*a*) The acute; a rapidly-spreading ulcer with cave-like extensions into the tissues, abundant discharge and exquisite pain.

(*b*) The subacute; this looks acute, but it is really an 8 to 10 months ulcer which appears like a lesion of 10 days, with pain and hæmorrhagic discharge.

(*c*) The chronic; with thickened edges, a small red point and very little discharge.

Occasionally, the infections seem to arise *de novo*, as an erupting and multiple condition associated sometimes with inflamed inguinal glands and a distressing high fever. Otherwise the causes can be classified as follows:—

(*a*) Injuries: (*i*) Broken, stubbed toe nails which cause a non-healing, subacute ulcer covering the nail bed from which remnants of the nail project.

(*ii*) Contused or incised wounds on the lower limbs, more rarely on the hands, forearms or back.

(*iii*) Healing burns.

(*b*) Secondary infection of syphilitic lesions: Many cases of generalized syphilitic eruptions show the lesions on the lower limbs altered by ulcus tropicum.

Treatment.—For many years we have treated these cases with a thick dusting of quinine sulphate for the first dressing and of cinchona powder for subsequent dressings. The effect is magical. One can safely promise relief of the pain within half an hour and sleep that night. The ulcer fills up rapidly and heals completely within a fortnight. Some severe ones take 3 to

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4 weeks, but the agony is gone. During the last few years the use of sodium bicarbonate solution to clean the ulcer has taken away the torture of the dressing, which is now quite painless. People come across-country 10 to 15 miles to our weekly road-side ambulance for treatment and often we have 16 to 25 cases a day. It is the painless dressing and the quick relief that appeal to the people. One boy brought seven adults the week after he had been treated. Several of them sat with tears running down their cheeks in terror of the dressing and the blissful surprise at its painlessness was very satisfying.

The method is this:—Make a solution of sodium bicarbonate in cold water, roughly two drachms to a pint. Soak cotton-wool in it and simply apply it to the ulcer, after a few minutes remove it and the glairy discharge will adhere to it; repeat this three to five times until the clean rough red base appears. Dust on quinine or cinchona powder thickly and dress. Give the patient a week's supply of sodium bicarbonate and of cinchona (of the latter 5 to 10 grains for each daily dressing is usually sufficient) and instructions to carry out the same method at home, being careful to remove the remains of the previous day's cinchona. Next week the patient returns with the ulcer often level with the skin and the report of no pain and good sleep from the first night. The dressing is repeated and another supply of sodium bicarbonate and cinchona given. The method has the additional advantages of being efficacious, cheap and of requiring no special skill. We have passed on the method to village teachers and workers. In road-side work we frequently use cinchona as a prophylactic dressing for fresh wounds as so many of them develop ulcus tropicum later.

There is another point; do not give potassium iodide internally; rapid spread of the ulcer usually results.

A CASE OF THROMBO-ANGIITIS OBLITERANS.

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Indian Military Hospital, Poona.

HITHERTO as far as I am aware no case of thrombo-angiitis has been reported in India. A brief résumé of some of the known facts about this rather obscure disease may, therefore, be of interest.

Diseases of arteries are classified as organic and functional. The former includes thrombo-angiitis and arteriosclerosis, while Raynaud's disease—due to vasospastic changes—and erythromelalgia—due to vasodilator phenomena—form the functional group.

This disease has been defined as an inflammatory disease of the blood vessels of unknown origin (Buerger). The exact cause of the disease is unknown though several predisposing factors undoubtedly play an important part in its causation. Silbert (1927) attributed it to smoking, but several cases have occurred among non-smokers. The earliest cases on record occurred chiefly among Russian and Polish Jews, but recently cases have occurred in London, America and even China. No age is exempt though among the Russian Jews in London cases occurred among persons between 40 to 60 years. Bowers has recorded cases of gangrene of the nose in children under 10 years. At first these latter cases were thought to be due to diabetes, but the balance of opinion was in favour of gangrene due to Buerger's disease.

There are three well-known types of the disease.

(1) Early type, limited to the lower extremities without gangrene.
(2) Chronic type, with gangrene of one or both lower extremities.
(3) Chronic type, with involvement of upper and lower extremities.

The onset begins with numbness and pain in the legs followed by gradual and progressive absence of pulsation, first in the smaller arteries like the dorsalis pedis, then in the larger arteries like the posterior tibial and popliteal. In the later stages œdema occurs with certain trophic lesions accompanied by excruciating shooting pain which ceases with the commencement of gangrene. Absence of pulsation in the arteries is noted long before gangrene commences. Where gangrene sets in early the prognosis is bad, otherwise there are long periods of remission and the course sometimes extends to as many as twenty years.

In one type of this disease there is sudden onset of spontaneous pain, pallor and later cyanosis of one or more toes which rapidly ulcerate. The extreme pain is said to be due to the fact that the nutrient arteries of the nerves are frequently the site of this process, while Silbert believes that the pain arises from the fact that the nerves undergo complete degeneration as a result of being gripped in the fibrous tissue which surrounds the blood vessels.

Pathology.—It is not proposed to go into this in detail, suffice it to say that in one case Girdwood found that the arteries, venæ comites and nerves were all matted to each other and to the surrounding tissue by dense fibrosis. Histologically the lumina of the arteries was occluded by a thrombus which had become re-canalized. The internal elastic layer was thrown into folds by contraction and dense cellular infiltration was seen in the media around the vasa vasorum. The muscular coat, the adventitia and the surrounding tissue had undergone fibrosis.

Diagnosis.—Robert N. Grier remarks that more than 80 per cent. of cases of thrombo-angiitis obliterans seen at the Mayo clinic were previously diagnosed incorrectly. Though in

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about 30 per cent of cases of thrombo-angiitis Raynaud-like phenomena are present yet evidence of obstructive arterial disease will always be found on careful examination. In the case of the upper extremities, intermittent pallor and cyanosis, the early symptoms of thrombo-angiitis, may be mistaken for Raynaud's disease.

Treatment.—"The pain which is the chief symptom makes life unbearable. Many treatments, most of them unsuccessful, have been tried in order to give relief. Counter-irritation and passive hyperæmia are useless. Morphia and its derivatives are dangerous, because the injections have to be repeated and in the end become ineffective. Surgical methods are deceptive. Arterio-venous anastomosis is illogical, for both vein and artery are thrombosed. Tying the femoral vein has not been successful."

Therefore treatment to be effective should aim at:—

(1) Complete relief of pain.
(2) Permanent healing of trophic ulcers.
(3) Checking of gangrene.

In the past when once the disease was definitely diagnosed as such, amputation was the only treatment adopted irrespective of the stage of the disease, but the modern tendency is to reserve this measure of treatment only for those cases where actual gangrene has set in or where other remedies have failed.

Recently, Röntgen-ray therapy has been tried with various degrees of success. Buerger suggested arterio-venous anastomosis. Among drugs sodium citrate has been given by the mouth and intravenously. Ten grammes of the salt per day divided into five doses have been recommended for a fortnight and the dose gradually reduced thereafter (Lian and Barrier, 1923).

Steel employs a solution of 2 per cent. sodium citrate intravenously, 250 c.c. of this are given every second day and the legs are placed under a hot air electric bath at 110°. Daily leg massage is given and the patient put in a wheel-chair with feet hanging down a short time each day. Increased walking is permitted as evidence of a functional collateral circulation appears.

Potassium iodide is given during the whole course of treatment and is well borne. As a result of this treatment collateral circulation is established; ulcers heal and gangrene is prevented. Steel claims to have treated six cases, out of whom five were completely cured and the sixth was relieved to a considerable extent.

In 1915 Mayesima showed that there is increased viscosity of the blood in these cases and Ringer's solution hypodermically over long periods is therefore advocated (Koga).

Silbert (1927) uses a 5 per cent. solution of sodium chloride, 150 to 300 c.c. of which are given intravenously twice or thrice weekly.

The writer's case.

Sepoy Balu Rama, a non-smoker, aged 30 years, complained of two small ulcers on his right foot.

Previous history.—No previous history of syphilis, diabetes, etc. On 7th March, 1930, the patient felt slight pain in the toes of his right foot and observed the next day that two small blister-like swellings had appeared one on the great toe and the other on the little toe. These subsequently became purulent and a few days later the nails of the great and the little toes fell off. Since then the ulcers have not healed and the patient feels acute gripping pain shooting up the right leg. The question of amputation having been considered he was transferred to this hospital on 23rd April, 1930.

Local condition on admission.—The whole of the right leg is colder than the left and pulsation of the popliteal, posterior tibial, and dorsalis pedis arteries cannot be felt. There is a clean anæmic-looking ulcer, of the size of a rupee, on the great toe in the region of the nail. The edges of the ulcer are clean, sloping inwards and extremely painful to cutaneous stimuli. There is complete absence of surrounding inflammation. A similar, but smaller, ulcer is present on the little toe. The surrounding skin and subcutaneous tissue are cold to the touch, but sensation is not impaired. The femoral glands of the right side are not enlarged. There is no area of anæsthesia. Pain is relieved by walking and the patient feels better while hanging his legs down. His right radial pulse is thinner in volume than the left.

All other systems and organs normal.
Wassermann reaction negative.

Differential diagnosis.

1. Raynaud's disease.—This is rare in a tropical country, and occurs usually between the ages of 15–20 years, among delicate, anæmic, hysterical or emotional and easily excitable persons, chiefly women; it is symmetrical and the parts affected are cold and completely anæsthetic. All the toes or all the fingers are affected at the same time and the pulse though thin is always perceptible.

2. Syphilitic endarteritis.—Absence of history and enlarged glands and negative Wassermann exclude this disease.

3. Erythromelalgia.—In this disease the veins are enlarged, the arteries throb visibly, walking or hanging the legs down makes the patient worse.

4. Leprosy, diabetes, gangrene due to drugs, and syringomyelia are easily excluded.

5. Intermittent claudication—arteriosclerosis is generally present and walking makes the patient worse.

6. Spontaneous gangrene.—Occurs in persons with arteriosclerosis, usually in women during the puerperium. The gangrene is usually dry and a distinct line of demarcation forms and there is complete loss of sensibility in the part.

Diagnosis.—The coldness of the limb with shooting pains in the leg, loss of pulsation of the arteries and absence of the cardinal signs of gangrene are in favour of thrombo-angiitis. The fact that only one limb has been affected and that during these several months the disease has remained stationary suggests the commencement of a collateral anastomosis. The fact that the patient feels better after walking is also in conformity with the above diagnosis.

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Treatment.—During his stay in hospital he was given syrupus ferri iodidi and cod-liver oil, internally.

Locally, the limb was wrapped in cotton-wool and radiant heat was given thrice weekly.

Ten grammes of sodium citrate a day, divided into five doses, were given for a fortnight.

He showed considerable improvement during his stay in hospital; the ulcers began to heal and on 4th August, 1930, he was transferred with a recommendation for invaliding out of the service.

His subsequent history is as follows:—

By the end of September 1930 his ulcers had completely healed, his pain entirely disappeared and he is now moving about like a normal man.

This case is similar to those described by Weber, Rast and Lutterotti (1930) with this important difference, Balu Rama is a non-smoker and the cure is mainly attributable to diathermy.*

Referring to this case Lieut.-Colonel F. B. Shettle, O.B.E., I.M.S., says:

"This case was undoubtedly one of thrombo-angiitis obliterans. I have seen a few such cases previously during my service. There is food for thought as to whether some of those pale, pasty, anæmic, indolent, pitted, non-inflammatory, recurring ulcers of the toes or feet, which are sometimes never-healing or healing with the greatest difficulty, may not come in this category.

"These cases are familiar to civil surgeons in out-patient departments of civil hospitals, but are hardly ever seen amongst serving soldiers."

My thanks are due to Lieut.-Colonel F. B. Shettle, O.B.E., I.M.S., Officer Commanding, the Indian Military Hospital, Poona, not only for his advice and permission to publish these notes, but also for allowing me to make use of his library.

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A NOTE ON THE OUTPUT AND DISTRIBUTION OF URINARY NITROGEN IN THE NORMAL PUNJABI.

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THE observations on which this note is founded were made in Lahore during the late winter and early spring. The subjects were all intelligent individuals on average diet and doing an ordinary amount of work of various kinds. They included laboratory workers and attendants, students and members of the staff of a hospital. All understood the nature of the investigation and therefore the importance of obtaining the whole of the 24 hours output of urine. Decomposition of the urine was guarded against during the collection of each sample by the addition of a few drops of toluol. The following quantitive methods were employed in the investigation.

Urea: method of Van Slyke and Cullen—decomposition by urease and aeration by suction (Van Slyke and Cullen, 1914).

Ammonia: method of Van Slyke—aeration by suction—as given by Cole (1926).

Uric acid: Morris' method (1922).

Creatinine: Folin's method (1914).

Almost all the nitrogen metabolised in the body is excreted in the urine and hence the amount of urinary nitrogen varies in different races and individuals according to the amount and variety of protein in the diet. Of the different nitrogenous constituents urea is known to originate in the liver from the de-amination of proteins either ingested or derived from the body tissues. Folin distinguishes these two sources as exogenous and endogenous, respectively. On a high protein diet the urea accounts for upwards of 90 per cent. or more of the total urinary nitrogen. The exogenous urea begins to appear in the urine soon after ingestion of protein. Starling (1930) states that "on giving a large protein meal to a dog the urea in the urine rapidly rises, and at the end of four or five hours 50 per cent. of the total nitrogen ingested with the food has appeared in the urine as urea." In contrast to the urea nitrogen, the creatinine nitrogen varies very little with the amount of protein in the food. It is to be regarded "as the direct product, not of protein metabolism, but of the metabolism of the muscle as a whole" (Starling). It probably results from the breakdown of the phosphagen of muscle, some of the creatine liberated being excreted as creatinine. The fact that it is increased in the urine when there is rapid breaking down of muscular tissue and after muscular exercise is evidence of this. Of the other nitrogenous constituents of the urine the uric acid is an index of the amount of nucleo-protein undergoing metabolism and the ammonia, which is formed in the kidney, varies with the amount of acids which have to be excreted.

As proteins contain on an average 16 per cent. of nitrogen the amount of protein represented by the nitrogen excreted is obtained by multiplying by 6.25. It is usual in experiments on man to regard one gramme of the daily nitrogen of the fæces as belonging to the output of the body as this amount is excreted by the mucous

* (The author's meaning is not clear; he does not mention diathermy as having been applied in the treatment in this case.—EDITOR, *I. M. G.*)

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No.	Mean humidity.	Mean temperature.	Age and religion* of subjects.	Weight in kilo-grammes.	Grammes *per diem*.					Milligrammes per kilogramme of body weight *per diem*.			Diet.
					Total nitrogen.	Urea nitrogen.	Ammonia nitrogen.	Creatinine nitrogen.	Uric acid nitrogen.	Total nitrogen.	Urea nitrogen.	Creatinine.	
1	66.8	67.5°	24, H.	47.27	8.26	6.85	0.25	0.36	0.08	175	145.0	20.5	Vegetarian with eggs.
2	71.0	66.7°	32, S.	65.45	11.24	5.08	0.30	0.42	0.14	172	77.5	17.4	Mixed.
3	60.8	64.4°	28, H.	50.0	6.56	4.57	0.27	0.31	0.13	131	91.4	17.0	Vegetarian.
4	59.8	69.9°	35, S.	73.63	9.74	7.71	0.45	0.48	0.22	132	104.8	19.1	Mixed.
5	65.0	70.0°	36, H.	50.0	7.34	5.97	0.16	0.34	0.06	147	119.4	18.6	Vegetarian.
6	42.8	62.1°	38, H.	60.9	8.50	7.10	0.39	0.44	0.06	140	115.1	19.5	Mixed.
7	58.4	66.2°	27, H.	65.0	9.36	7.10	0.60	0.44	0.10	144	109.3	18.4	Do.
8	62.8	64.3°	29, S.	84.54	11.90	8.72	0.68	0.50	0.11	141	103.2	16.1	Do.
9	50.2	72.0°	21, H.	50.0	9.00	5.68	0.32	0.42	0.06	180	113.6	22.6	Vegetarian.
10	50.2	72.0°	24, H.	57.27	7.70	5.71	0.49	0.42	0.09	135	99.7	19.9	Do.
11	53.0	74.9°	40, H.	74.54	9.70	6.45	0.55	0.54	0.10	122	86.6	19.7	Mixed.
12	53.0	74.9°	30, M.	79.54	12.20	9.82	0.38	0.53	0.10	153	123.5	15.5	Do.
13	57.2	75.1°	25, H.	52.72	6.70	3.98	0.22	0.42	0.09	127	75.5	21.6	Vegetarian.
14	50.8	80.4°	21, H.	54.54	7.70	4.33	0.23	0.34	0.10	141	79.4	17.1	Do.
15	44.6	76.4°	40, M.	80.0	10.80	6.76	0.44	0.67	0.11	135	84.5	22.5	Mixed.
16	47.4	77.5°	26, H.	51.82	7.28	3.13	0.73	0.41	0.08	141	60.5	21.2	Vegetarian.
17	51.0	77.3°	23, H.	44.54	7.40	4.36	0.44	0.47	0.05	166	87.9	28.2	Do.
18	52.2	72.4°	34, S.	63.63	8.68	5.27	0.60	0.41	0.10	136	82.8	17.2	Do.
19	51.6	74.3°	37, H.	57.27	6.39	4.54	0.27	0.41	0.06	112	79.3	19.2	Mixed.
20	50.2	75.2°	27, M.	50.0	7.90	3.88	0.32	0.37	0.07	158	77.6	20.2	Do.
21	52.2	75.5°	39, M.	80.9	7.90	3.83	0.47	0.42	0.08	98	47.4	13.9	Do.
22	50.0	75.8°	30, S.	69.54	6.93	4.38	0.36	0.31	0.09	100	63.0	12.2	Do.
23	77.6	69.6°	28, H.	44.54	7.69	5.35	0.39	0.40	0.11	173	120.5	24.0	Vegetarian.
24	77.6	69.6°	23, H.	57.27	8.30	4.55	0.26	0.41	0.06	145	79.3	19.2	Do.
25	52.4	77.8°	29, H.	54.54	6.25	3.33	0.16	0.36	0.09	120	60.98	17.6	Do.
26	50.8	80.4°	29, S.	63.63	7.54	3.70	0.10	0.47	0.07	118	58.2	19.8	Mixed.
27	44.2	85.9°	27, S.	64.54	8.70	6.65	0.45	0.52	0.08	135	103.1	21.6	Do.
28	48.4	81.7°	26, H.	64.54	5.32	3.42	0.13	0.46	0.07	82	52.99	19.2	Do.
29	39.2	82.2°	29, H.	53.18	6.68	3.04	0.11	0.47	0.07	126	57.14	23.6	Vegetarian.
30	39.2	82.2°	24, H.	62.72	6.76	3.08	0.19	0.48	0.07	108	49.13	20.7	Do.

* H. = Hindu. M. = Muslim. S. = Sikh.

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membrane of the gut in a normal individual during complete starvation.

The results are given in a table which also includes the mean temperature and humidity on the day of each experiment. It will be noticed that the 24-hour volume of urine is less than 1,000 cubic centimetres in about half the subjects. The total nitrogen varies from 12.20 to 5.32 grammes per day, the output per kilogramme of body weight varying from 175 to 82 milligrammes. The corresponding figures for urea were 10.20 and 3.27 grammes in the one case and 150 and 52 milligrammes in the other. The different amounts of protein in the dietaries of different individuals are reflected in these figures. They are lower than the averages given in European and American text-books, in some cases markedly so, but on the other hand in only one individual was the total nitrogen as low as that found by McCay (1912) in the average Bengali (6 grammes). The creatinine nitrogen (0.67 to 0.31 grammes per day) shows a smaller variation than the urea nitrogen and is also less than in western races, but the creatinine coefficient, or amount per kilogramme of body weight per day (13.7 to 22.6 milligrammes), approximates western standards.

We are indebted to Major H. S. Anand, I.M.S., Professor of Physiology, King Edward Medical College, Lahore, for permission to use his laboratory.

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THE NATURE OF THE BACTERIAL SUBSTANCE OF AN ORAL ANTI-DYSENTERIC VACCINE.

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THIS investigation was undertaken to determine the nature of the bacterial substance contained in the antidysenteric oral vaccine of a well-known brand. The tablets were obtained from the Indian agents in the original containers similar to the one supplied to the public for prophylactic purposes. The manufacturers claim that each tablet contains 50 milligrammes of heat-killed and desiccated bacilli of Shiga, Flexner, Hiss and Strong which is equal to about 60 to 70 billions of the microbes. It is further claimed that the immunising power holds good for any type of bacillary dysentery. It is not possible to identify by chemical or physical methods, in the present state of our knowledge, the specific proteins of each species of bacterium though we can do so—fairly accurately—by their specific immunological reactions. The method of testing the agglutination reaction of an unknown bacterial emulsion with the various known antisera, as well as the preparation of an antiserum for testing against known bacteria, is too well known to be discussed here. This principle has been the underlying idea of the experiments (noted below) carried out to test the nature of the bacterial substance contained in the tablets.

Experiment I.

(*a*) One tablet of the antidysenteric oral vaccine was dissolved in 40 c.cms. of normal saline bringing the strength of the emulsion to $1\frac{1}{2}$ billions of organisms per cubic centimetre (each tablet is claimed to contain about 60 billions bacilli). The following quantities were injected into a rabbit.

1st day—0.1 c.cm. of the emulsion injected subcutaneously.

4th day—0.2 c.cm. of the emulsion injected subcutaneously.

9th day—0.5 c.cm. of the emulsion injected intravenously.

14th day.—1 c.cm. of the emulsion injected intravenously.

No toxic or other untoward symptoms were noted in the animal during the course of the experiment.

Blood was collected on the 18th day; the serum was separated and put up against stock emulsions of *B. dysenteriæ* (Shiga, polyvalent, Flexner, Sonne, etc.). Dreyer's standard method was used; no agglutination was noted in any of the dilutions.

(*b*) The emulsion of the tablet was also tested with high titre Shiga and Flexner sera but no agglutination was noted even in the lowest dilution.

Experiment II.

As no toxic effects were noted in experiment I, it was decided to use a stronger emulsion of the vaccine tablets.

(*a*) The emulsion was made by dissolving 1 tablet in 5 c.cms. of normal saline.

Four injections of a cubic centimetre each at intervals of 5 days were administered to a rabbit intravenously. Blood was collected 5 days after the last injection. The agglutination tests detailed in experiment I proved to

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be negative in all cases. After the injections no toxic effects were noted in the animal.

Experiment III.

The sera obtained in experiments I and II were tested against the emulsion of the tablet described above, but no agglutination was noted.

To get some rough idea of the chemical composition some of the well-known tests for proteins and carbohydrates were applied, with the following results.

The opalescent brown emulsion had a faint smell resembling that of meat extracts. The emulsion was not coagulated by heat, was negative when tested with Heller's test and did not give the biuret reaction. It was positive with Fehling's and Benedict's tests for sugars but gave no iodine reaction for starch.

Summary of results.

1. It is evident from the above that the bacterial substance claimed to belong to the Shiga, Flexner, Hiss and Strong types is not agglutinated by their respective high titre sera.

2. The substance itself is incapable of producing a serological response in animals and produces no toxic effects when injected intravenously in large doses in rabbits (*c. f.* Shiga emulsions).

APPLICATION AND USE OF LARVICIDES.

By K. BOSE,

Honorary Secretary, Birnagar Palli Mandali.

AT the Conference held at Birnagar in February 1929 to discuss the problem of malaria in that town, I submitted a proposal for concentrating attack upon *Anopheles philippinensis* which was found to carry malarial parasites in Nature in the Nadia District. In preference to a general campaign against anophelines, Sir Malcolm Watson, who presided at the meeting, accepted the view that the breeding grounds of *A. philippinensis* should be located in co-operation with the Public Health Department, Bengal, and dealt with by larvicides, but suggested at the same time that the campaign against other anopheline species breeding in numerous other tanks and pools at Birnagar should be continued. It must be admitted that our knowledge of the carrier species at Birnagar was inadequate at that time and he was fully justified in supporting the continuance of a general campaign of oiling which had been our aim at the beginning. I have explained in my previous reports that this "general campaign" was, in practice, of a restricted nature owing partly to the public opposition and partly to the inadequacy of our funds.

As a result of a subsequent survey we found *A. philippinensis* breeding not only in certain of the tanks and pools but in extensive marshy lands both in and outside Birnagar. In view of our limited resources, we were compelled to confine oiling operations to the *philippinensis* breeding grounds only, which covered a large area, during the non-malarial season from March to the beginning of July 1929, when a general campaign was inaugurated in accordance with Sir Malcolm's advice. Three mosquito brigades had to be formed, namely, the oil brigade consisting of 3 men for dealing with numerous tanks, the Paris green brigade consisting of 2 to 3 men, according to circumstances, for treating the canal and pools, and a third brigade consisting of 3 men for making experiments with soluble cresol in marshy tracts, such as Purana Dighi.

All this expenditure proved too much for the Mandali to bear, and although we managed to carry our wider programme throughout the rains we were obliged to revert to the policy of treating the *philippinensis* breeding grounds only, from December 1929. This arrangement was followed till March 1930. The mosquito survey at Birnagar, a report of which will be found in the June number of the *Records of the Malaria Survey of India,* shows conclusively that *A. philippinensis* is the principal carrier of malaria at Birnagar, and that even if other anopheline species are subsequently found to carry the malarial parasite they must have a low infectivity.

I shall now deal with the respective merits of crude oil, Pesterine M. D. B.,* soluble cresol, and Paris green. In order to get a good spray we mixed crude oil with solar oil. The use of this larvicide was wholly superseded by Pesterine M. D. B., which gives a better film, on the recommendation of Sir Malcolm Watson in 1929. Where the breeding pools are free from vegetation it is advantageous to spray oil at the water edges. This was done every ten days. Where tanks or pools are covered with water weeds they have to be cleared every time before the application of oil for effective larval control. If such tanks are partially cleared at the edges only, the oil film cannot penetrate through the thick vegetation so that the larvæ in the rest of the water surface escape destruction. Certain devices have from time to time been adopted for dealing with anopheles breeding in the middle of a big tank (Khan Dighi), such as hanging a ball of cotton waste dipped in oil, or small gunny bags filled with saw dust soaked in oil, on a bamboo pole driven to the bed at intervals. But this contrivance was found to be laborious and could not be continued as a permanent measure without a large staff. It may be mentioned that if vegetation is completely removed from

* Pesterine M. D. B. is the particular mixture of crude oil and kerosine oil which was recommended by the Mosquito Destruction Board in the Straits Settlements.

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a tank, breeding of mosquitoes in the middle ceases and is then confined to the edges only. Removal of aquatic vegetation is a costly business as it has to be undertaken periodically, in many cases every fortnight during the rainy season. It has been found impossible to stop growth of vegetation merely by such clearance, except in a few cases where conditions were favourable, *e.g.*, Mustafi Dighi. For permanent eradication re-excavation of tanks is essential, but the cost is prohibitive. It will thus be observed that the use of oil as a larvicide involves a twofold expense, *viz.*, the cost of oil and the cost of periodical weed clearance.

We have made experiments with soluble cresol (B. C. P. W.). The composition of this larvicide is creosote 50 per cent. corresponding to cresylic acids 10 per cent., the rest being soap and water. It is mixed with 24 times its quantity of water before spraying and is applied once a week. It does not apparently kill the mosquito eggs, for we invariably found numerous first stage larvæ the day after it was applied. These however perished in the course of that day, suggesting thereby that soluble cresol remains active for at least 36 hours. Similar action on larvæ was noticed in using Paris green in several breeding pools. The milky white emulsion of soluble cresol penetrates slowly through the thick vegetation and kills all mosquito larvæ, both culicine and anopheline. At Purana Dighi where leeches hindered our work they were exterminated by four weekly applications of soluble cresol. Aquatic vegetation turned brown and was partly kept under control. If we had used this larvicide twice a week or in stronger solution the control of vegetation would probably have been more satisfactory. Water weeds also turn brown when oil is spread over them, but as we apply it every ten days the effect is only temporary. The use of soluble cresol has its limitations as it cannot be applied to tanks used by the public.

Paris green (copper aceto-arsenite) was introduced at Birnagar in 1929 when it was applied by means of hand blowers. On account of the limited capacity of hand blowers we could not make any extensive use of Paris green. Dr. Louis Williams, the American representative of the League of Nations' Malaria Commission, and Lieut.-Colonel J. A. Sinton advised us to use rotary blowers, the need of which had been anticipated in my annual report for 1928-29. Dr. Hacket considered road dust to be the cheapest and best diluent for Paris green but recommended as possible substitutes wood-ashes, spoiled flour, lime, fine sand and cork dust. Following this recommendation we used a mixture of ash and sand in diluting Paris green, but Dr. Williams objected to the use of ash as a diluting medium. He expressed the view that for effective larval control the dust selected should be capable of sinking quickly leaving Paris green alone on the water surface. The reason advanced was that the anopheline larvæ have the habit of eating particles of substance they see on the water surface, and if the dust floats for days together they would feed on it and become gorged, with the result that they would not then care for Paris green and consequently escape destruction. Consistently with this view we undertook a series of experiments with sand, soapstone, lime and old brick dust (*soorki*) by using American rotary blowers of the dust-gun type. The pipe of the blower is choked when sand is used unless it is mixed with soapstone or lime. Ash and soapstone float over the water surface for a considerable time, often for over 3 days. Lime has also this defect to some extent. Old brick dust, *i.e.*, dust made from bricks obtained from the ruins at Birnagar which are over a hundred years old, seemed to fulfil the condition mentioned above. This brick dust is passed through a fine sieve and thoroughly dried before use. By its nature the individual particles are not of uniform size, unlike soapstone, so that the coarser powder from the dense cloud of dust falls right at the spot from which the machine is worked and the finest is carried to a distance usually covered by soapstone or lime. Old brick dust generally sinks within half an hour leaving on the surface a green film which is clearly visible. So far as the sinking properties are concerned it is superior to soapstone and lime. As a result of our experiment we are now using this dust in preference to others.

Since the introduction of rotary blowers in August 1930 considerable economy has been effected in the use of Paris green. We found the hand blowers generally unsuitable for our purpose. By using hand blowers Yacob and Shah (1930) required 150 grains of Paris green to treat 100 square yards of water surface, and Sur and Sarkar (1929) used 70 grains of Paris green for the same water surface. By using rotary blowers (American Peerless Dust Gun) we found that only 15 grains sufficed to deal with the same water area. This result was obtained by mixing 5 per cent. of Paris green with the dust.

In using Paris green blowers time is often wasted in waiting for a favourable breeze when it is constantly changing in direction as is very often found to be the case, but this inconvenience is minimised if two blowers are taken by two coolies from different directions. Rotary blowers have great advantages over sprayers in the large expanses of water which have to be dealt with from boats. The blower is fixed on a revolving base at the head of the boat for easy manipulation. In Purana Dighi, a marshy land full of tall grasses and other weeds having an area of over 12 acres, it took us 8 days to complete a round in spraying it

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either with oil or cresol by means of a boat with three men working five hours a day, whereas with a rotary blower the entire water surface was "greened" in about 2½ hours with a favourable breeze. The dust penetrated through the grasses and the weeds and spread evenly on the water surface. At Khan Dighi where the water surface is for the most part covered with lotus leaves the dust blew not only over but under the leaves causing anopheline larvæ to perish. It will thus be observed that no clearance of weeds is necessary if Paris green is used as a larvicide. This means a great saving in money.

The following is a comparative statement of cost of different larvicides tried at Purana Dighi during the rainy season when the water surface measured 59,774 square yards. The larvicides were in all cases applied from a boat.

Any one familiar with the condition of the breeding grounds of Bengal will realise the impossibility of effecting any permanent clearance of water weeds from them. So Paris green has come to us as a boon in this respect. Although it does not kill culicines it is the cheapest larvicide of which an extensive use can be made.

Fig. 1.—Peerless dust gun mounted on a revolving base for easy application of Paris green.

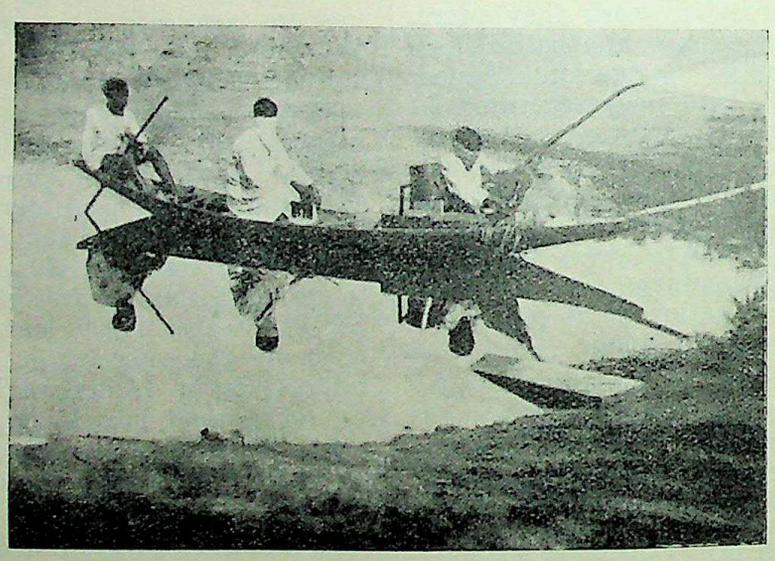

Fig. 2.—The dust gun in action.

In using Paris green it is essential that we should make our dust in the dry season in enough quantity to last one whole year and store it in such a way that no moisture can get into it. If that is done there will be no trouble in the rainy season. We grind our bricks by means of a *denky* (rice husking appliance) and store the dust in broken steel drums and tin-lined packing cases. Paris green is

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RESULTS OF EXPERIMENT.

TABLE I.

Showing cost of round.

Larvicides.	Appliances used.	Quantity required per round.	Cost of larvicides (excluding freight).	Time taken to cover each round.	Cost of staff (3 men).	REMARKS.
			Rs. As. P.		Rs. As. P.	
Crude oil ..	Sutton's Four Oak Sprayer.	64 gals.	24 0 0	40 hours	14 2 0	Oil did not spread owing to dense vegetation, hence heavy consumption of oil.
Soluble cresol	Myer's Spray Pump.	6 gals.	6 12 0	40 hours	14 2 0	Mixed with 24 volumes of water before spraying.
Paris green ..	American Peerless Dust Gun.	1 lb. 4 oz.	1 1 0	2½ hours	0 14 0	Five parts of Paris green mixed with 95 parts of brick dust.
Old brick dust	....	26 lbs.	0 4 0			

TABLE II.

Showing cost per month.

Larvicides.	Number of application per month.	Quantity required.	Cost of larvicides.	Cost of staff.	Total cost, excluding railway freight and cart hire.
			Rs. As. P.	Rs. As. P.	Rs. As. P.
Crude oil ..	Three times	192 gals.	72 0 0	42 6 0	114 6 0
Soluble cresol ..	Four times	20 gals.	27 0 0	56 8 0	83 8 0
Paris green ..	Five times	6 lb. 4 oz.	6 9 0	4 6 0	10 15 0

applied to the water surfaces every six days except during the 2½ months of the winter season (December to middle of February) when retardation in larval development permits us to extend the interval to 8 days.

The League of Nations' Malaria Commission has recommended a wider use of Paris green, particularly in rural areas where nothing is being done. The Paris green used by us, obtained from Messrs. Siegle & Co., Germany, is said to contain 57.7 per cent. arsenious anhydride. Our experience shows that when the weather is clear it floats on the water surface for 2 days or more. Arsenic is a cumulative poison and as such application of Paris green is open to grave objection in the case of water intended for drinking or domestic purposes. The matter formed the subject of discussion between the Chief Medical Adviser to the Mandali and certain members of the Commission. The latter held the drug to be non-injurious to human beings and following their advice our Chief Medical Adviser has waived his objection to the application of Paris green to three of the tanks at Birnagar, *viz.*, Khan Dighi, Bhattacharjipokur and Champa, which are full of aquatic weeds and which cannot be adequately dealt with by oil owing to enormous cost of periodical weed clearance. The Chief Medical Adviser, however, thinks it wise to keep a look-out for the appearance of any insidious symptoms amongst people using the water. He has recommended a chemical analysis of water after the application of Paris green. Since the introduction of tube wells into Birnagar in 1925 tank water is rarely used for drinking purposes, but some people do use it for cooking and washing purposes. People coming to fetch water are advised to fill their pitchers after ruffling the water by hand, so as to remove the dust. The Palli Mandali is engaged in propaganda to popularize the use of the tube-well water for all domestic purposes in preference to tank water.

Pesterine M. D. B. is now applied to tanks used by the public for domestic purposes. Use of soluble cresol has been altogether discontinued. Paris green is wholly used in marshes, canals, pools and disused tanks. Wider use of this larvicide has hitherto been hampered mainly for lack of information in India about the suitable type of blowers to be used for the purpose.

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QUININE PROPHYLAXIS AND OTHER NOTES ON MALARIA.

By J. F. JAMES, M.B.,
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Indian Military Hospital, Nowshera.

THESE notes are the result of an attempt to evolve an easy and efficient method of quinine administration to troops. Such points as accuracy of dosage, regular attendance, time occupied, and simplicity of dispensing and distribution are factors for consideration.

The instructions for quinine prophylaxis originally issued in this hospital were as follows:—

1. "Quinine for prophylaxis will be issued in packets of 4 ozs. of quinine mixed with 1½ lbs. of magnesium sulphate. This, dissolved in 1¼ gallons of water, with the aid of sulphuric acid, gives a quinine content of approximately 10 grains to the ounce and is sufficient for 200 men. E. I. jugs will be provided for preparing the mixture, and a mark should be made at the 1¼ gallons level."

(*Note.*—Mixing quinine with magnesium sulphate not only tends to keep the bowels open, but renders the quinine unsaleable.)

The paper packets are enclosed in cotton bags, in case of breakage between the dispensary and the medical inspection room. A further simplification would be to include citric acid in the packet as a solvent. The mixture is portable and easily dispensed. Such packages, suitably packed with or without the magnesium sulphate, would be an improvement on quinine tablets for troops in the field.

The dose works out at 9.45 grains of quinine per ounce by Apothecaries' Weight, but on testing, the quinine content was found to be lower, *viz.*, 8.75 grains, owing to avoirdupois weights having been used. The returns from the medical inspection rooms show that the issue of 191,077 doses involved an expenditure of 204 lbs. 12 ozs. of quinine. Thus each man got 7.55 grains per dose. This low dosage is apparently attributable to spilling from the measure, which was too shallow, back into the *degchi.* As the dose appeared to be sufficient, however, no change was made in the existing arrangements. Whether such a dose would be sufficient in a bad malaria year, I do not know.

2. "A measure holding when full exactly one ounce will be provided from the Indian Military Hospital. Quinine solution will be dipped out of an open vessel—for example, an aluminium *degchi*—and poured into glasses held over the *degchi.* Glasses should number at least six per unit, and one man will be told off to keep these glasses full, whilst another man washes them and places them ready for filling."

(*Note.*—The ounce measure was made by cutting down an aluminium cup, leaving some of the upper part to act as a handle. Narrow or conical glasses would be more accurate; such glasses, holding about 1½ ozs., can be bought in any bazaar for from 2 to 3 annas each.)

Method of administration.—Two orderlies stand behind a bench, in the middle of which is placed the *degchi* of quinine mixture. Full glasses at one end of the bench are picked up and drunk by the troops as they file past. They are then placed empty at the other end, where they are washed, first in a bucket containing water, and then in another containing weak permanganate solution, before refilling. Each man calls out his name as he passes a table where the attendance roll is checked. One hundred men can be given their dose in six minutes without hurry, and with four such stations a whole regiment finishes in from 10 to 15 minutes. There should be no waste and no evasion.

3. "A number of 64-ounce bottles will be issued to each medical inspection room, into which the balance of the mixture left over daily should be decanted, and checked with the number of men treated."

(*Note.*—The total check is done by filling in a form for each unit with the following headings:—Date, number on parade, number attending at other hours, grand total, regimental strength excluding sick, total absent, amount of quinine used, amount of quinine received from the dispensary.)

Samples of the quinine mixture are taken periodically by the medical officers and sent to the Indian Military Hospital for testing. The method used is as follows:—To equal quantities of water—say half an ounce—are added 10, 9, 8, etc., drops of a standard strength of quinine solution of 10 grains to the ounce and 10 drops of the solution whose strength is to be tested. With a pipette mix each in order with an equal quantity of Tanret's solution in small tubes of equal calibre, and compare the opacities. The number of drops of the standard solution of 10 grains to the ounce which correspond in opacity with that of the unknown solution gives the latter's strength in grains to the ounce. This method dispenses with Brown's tubes and stock mixtures of varying strength.

Results.—In 1930, owing to shortage of rainfall, absence of floods, and an efficient anti-mosquito campaign, the incidence of malaria was smaller than usual both in the military and in the civil populations. The accompanying chart shows what I believe to be

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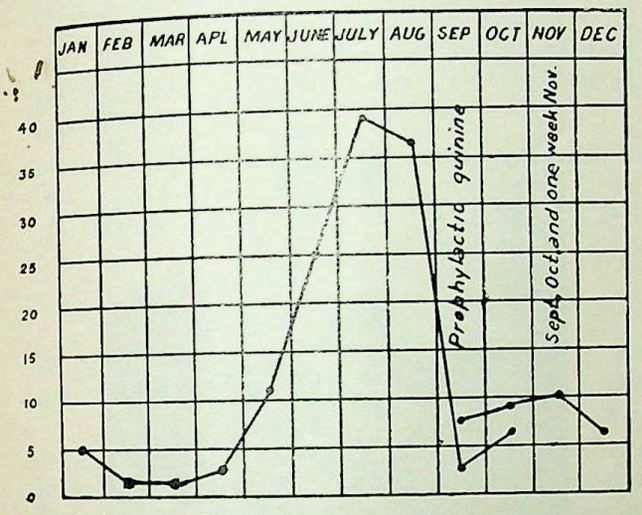
the effect of prophylactic quinine on relapsing benign tertian malaria,—in the relative absence of mosquitoes and of new infections. The curve from January to October shows the malaria incidence in men who were not on prophylactic quinine, and includes cases imported from other stations, patients who contracted the disease when on leave, etc. The shorter curve, September to December, shows the malaria incidence in troops on quinine prophylaxis. One unit—the 10th Battalion, 11th Sikh Regiment (Training Battalion)—with an average strength of over 870, had only 2 cases of malaria during the 10 weeks of prophylactic issue of quinine.



Admissions for malaria (*a*) among troops in general, January to October; (*b*) among troops on prophylactic quinine, September to December.

Urine testing.—In testing the urine, the picric acid method is very delicate. In 13 cases selected for trial the test remained positive for 17 hours after a dose of $8\frac{3}{4}$ grains. Three cases were still positive after 21 hours, but all were negative after 24 hours.

Diagnosis.—No case has been returned as clinical malaria since the following instructions have been in force:—

"Patients coming into hospital, suffering from what is clinically apparently malaria, will not be soaked with quinine as a matter of routine. The diagnosis of malaria is to be made by blood film examination, and such slides will be taken twice daily,—preferably when the patient has fever. If the combined thick-thin film fails to show parasites when a man has been in hospital without quinine for one week, it may be concluded that the patient has not got malaria, but is suffering from some other disease." Of fever cases which eventually proved to be malaria during the last eight weeks of prophylactic quinine, only 6 out of a total of 46 were missed at the first blood examination. Thus prophylactic quinine does not appear to mask the blood picture to any extent, at any rate where the thick-film method is used.

No one who has used the thick film method will ever revert to the thin film, except to identify the species of parasite present. Most of the examinations here were done with Giemsa's stain, by the method used at Kasauli. When we ran short of this stain, Leishman's stain was found to be equally effective. Certain points need to be stressed, as one knows by experience how often the staining goes wrong. The slide and the patient's finger must be clean and dry, and the slide should touch only the drop of blood and not the finger. One-third of the slide takes the thick drop,—spread not too thick, and dried not too hard. The sooner the drop is laked after drying, the better. The other two-thirds of the slide take the thin film. On the thin film is written with a pin point the name of the patient (thus obviating any chance of the slides getting mixed), the date, the temperature and the time at which the film was taken. The findings can be scratched on the film later on. If the film is left exposed to air under dusty conditions, dust may be found in the film and cause confusion in examination.

The stain must be reliable; many brands of stain are not. A stumbling block is often the water used. Distilled water is not a *sine qua non.* Tap, well, and even tank water may be used if properly neutralised and filtered. An acid water gives a pink stain, without the purple staining of the leucocyte nuclei, the criterion of a film which will show properly stained parasites. An alkaline water gives a blue-stained film with bad staining of the red corpuscles; but the blue may be satisfactorily decolorised with water. The film should always be examined first with the low power objective. This will enable one to judge whether the staining is or is not satisfactory; also occasionally it will show obvious leucocytosis, suggesting such a disease as pneumonia.

Parasites may be detected in two or three minutes in a thick film, where search of a thin film from the same blood for fifteen minutes may fail to detect them.

Treatment.—All crescent carriers, whether admitted to hospital and treated with quinine (only), or discharged from hospital with crescents in their blood, are foci of infection. The use of plasmochin during prophylaxis and treatment, and also after discharge from hospital, should go a long way towards reducing the incidence of malaria, presuming that it renders the gametocytes non-viable in the mosquito.

The effects of quinine in preventing the formation of crescents or in causing their disappearance has not been obvious in our series, whereas the addition of plasmochin appears to have had some effect in both these directions. Crescents, however, have persisted in two cases for as long as 9 and 10 days, respectively, after its administration. The appearance of crescents in patients within a day or two of their

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admission to hospital, and whilst on quinine treatment, suggests that quinine does not prevent the infection from going on to crescent formation.

The cessation of quinine prophylaxis in November was not followed by any considerable increase in malaria admissions. I have studied crescents in many patients under quinine treatment, but have failed to detect any morphological evidence of degeneration in them. In patients on both drugs one may encounter a proportion of malformed crescents which seem to become clubbed towards one or both ends and to stain faintly; there is always, however, a larger proportion whose shape and staining is normal.

No patient received more than 0.03 gramme of plasmochin daily. One patient complained of abdominal pain; the drug, however, was not stopped, and there were no subsequent symptoms. On the other hand, two European patients, taking the same dose, complained of palpitation of the heart on exertion whilst undergoing ambulatory treatment.

Relapses.—The table sent herewith* gives full details of the 57 cases of malaria admitted to hospital and observed during the period under consideration. Six of these patients—all cases of malignant tertian infection—were not on prophylactic quinine. Of the other 51 cases, 12 were benign tertian infections, and 39 malignant tertian infections.

Of 32 patients who were available for frequent blood examinations for from 5 to 10 weeks after leaving hospital, 5 relapsed. Details are as follows:—

Case 21.—On prophylactic quinine. Malignant tertian infection. Relapsed three times at intervals of 14, 12, and 14 days, respectively, after the cessation of each treatment.

Case 33.—Malignant tertian infection. Relapsed at intervals of 11 and 14 days, respectively, after the cessation of each treatment.

Cases 23, 24, 35.—These were all instances of malignant tertian infection, the first two patients being on prophylactic quinine at the time. Each showed one relapse, but the relapses were not accompanied by symptoms, and were only detected by finding parasites in the blood.

In these five instances, though it was not possible to absolutely exclude fresh infections, the recurrences occurred at a time when there were very few mosquitoes about, and it would appear probable that all were instances of relapse.

Quinine idiosyncrasy.—Fletcher and Travers, after 25 and 35 years' experience respectively in the Federated Malay States, record only one doubtful case of quinine idiosyncrasy. In our series, out of some 6,000 men on prophylactic quinine or on quinine treatment, two cases occurred. Details of these may be of interest.

Case 1.—C. T., 2/5th Gurkha Rifles, admitted with vomiting and an erythematous rash. Face flushed and puffy, with an anxious expression. He had taken quinine two hours previously. He stated that he had had a similar experience in 1915. After giving alkalies for two days, 10 grains of quinine was given; this caused an erythematous rash with itching in ten minutes, urticaria in twenty minutes, and much distress after fifty minutes. With hydrobromic acid as the solvent the symptoms were, if anything, more pronounced. The illustration shows very well the marked dermographia that appeared twenty minutes after the administration of 10 grains of quinine.

Case 1.—C. T., dermographia 20 minutes after taking 10 grains of quinine.

Case 2.—B. S., 2/17th Dogras, admitted with vomiting, flushed and puffy face and erythema, the result of taking a dose of quinine. A previous course of quinine in 1926 had had no ill effects. After two days of alkalies, quinine was again administered, but again produced a similar condition with itching all over the body. An hour later there was diarrhœa and vertigo, the conjunctivæ were injected and the respirations were 36 per minute. The Boerner skin reaction was positive to quinine in both cases in 4 to 5 minutes, and was fully developed in 8 to 9 minutes.

The Boerner reaction was negative in both cases with plasmochin and with quinidine. A subcutaneous injection of adrenalin relieved all symptoms after a few minutes, in both cases. On the other hand, if given prior to the administration of quinine, it failed to prevent these anaphylactic phenomena, which were produced by even such small doses as ¼ grain of quinine in the case of C. T.

Both patients took quinidine with impunity by the mouth.

Hæmatemesis.—During my service I have met with two cases of hæmatemesis, both of

* The table is too long and detailed to reproduce; the essential facts in it are presented in the text.—EDITOR, *I. M. G.*

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which appeared to be due to malaria. Both were European patients who had had no previous history of any such hæmorrhage, and both were suffering from a severe attack of malaria when the hæmatemesis occurred. In one instance malignant tertian parasites were present in the blood film; the second patient showed benign tertian parasites, but he had been touring in a district where malignant tertian malaria was extremely common, and had taken quinine for four or five days before the blood was examined.

The only reference to hæmatemesis due to malaria that I can find is in Barton and Yater's *Diagnosis*, where it is mentioned as one of the sequelæ of malaria.

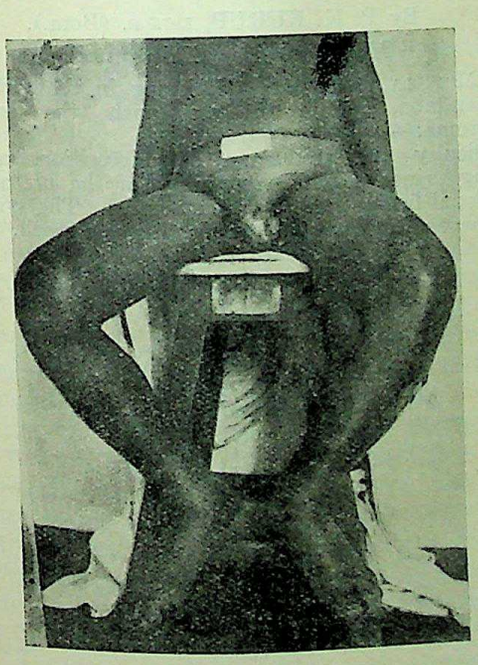
In conclusion, I have to thank Lieut. N. L. Sah, I.M.S., and Jemadar C. V. E. Mudali, Sub-Assistant Surgeon, I.M.D., for their work and assistance in the clinical side room.

A Mirror of Hospital Practice.

FILARIASIS (?).

By SAILENDRA NATH CHATTERJI, M.B., D.T.M.,
Assistant Research Worker in Leprosy, Calcutta School of Tropical Medicine.

AFTER going through the most interesting and instructive paper by Col. Acton and Dr. Sundar Rao entitled "The Diagnosis of Lymphatic Obstruction of Filarial Origin" published in the



Indian Medical Gazette, January 1931, I think it worth while to report an interesting case which was mistaken for filariasis. We received the case in half share with the filaria research department, as the officer who first saw the case, in his perplexity or oversight, referred this case to both the departments at one and the same time.

The patient's chief or cardinal symptoms were as follows:—

(1) Dyspnœa and cough for four months.

(2) Swelling of the feet, legs, thighs, scrotum, and penis—duration about the same.

(3) Anæsthesia over the dorsum of the left foot—duration 2 years.

On examination we found several depigmented patches on the body and extremities and anæsthesia over the dorsum of hands and feet and on the extensor surfaces of forearms and legs. The ulnar nerves were thickened and the peroneals were tender. Œdema was present; it first started in the feet and from there spread upwards. The abdomen was slightly distended with ascitic fluid, the skin over the lower extremities, scrotum, penis, and abdomen pitted on pressure, and the penis was distorted.

There was no history of the occurrence of œdema previously; the patient was temperate and active, he had suffered from malaria in childhood but never, so far as he knew, from kala-azar, dysentery, or syphilis. There was no history of any previous attack of filarial lymphangitis or orchitis and there was no enlargement of the inguinal glands although the groins were œdematous. Constipation was marked, and the urine was scanty and high-coloured. There was no history of a similar affection in any other member of his family.

The patient, a cultivator by occupation, was of spare build and the thin upper part of his body was in marked contrast with the œdematous lower part. He was unable to lie down owing to orthopnœa; his tongue was pale and coated, the conjunctivæ were anæmic, the eyelids free from puffiness; there were no abnormal pulsations in the neck. The heart was slightly dilated, and the apex beat was in the fifth interspace in the mid-axillary line. There were no hæmic murmurs; the pulse rate was 90 per minute, regular and of low tension. Total counts of blood were not done nor was the hæmoglobin percentage noted. The differential count and other findings were as follows:—

Polymorphonuclears	..	75 per cent.
Small mononuclears	..	15 ,,
Large mononuclears	..	6 ,,
Eosinophiles	..	4 ,,
Malaria parasites	..	*nil.*
Microfilaria	..	*nil.*

Blood for Kahn test—negative.

The patient complained of cough and there were signs of chronic catarrh in both lungs. Dyspnœa was pronounced especially on attempting to lie down. The abdomen was distended and an abdominal thrill could be distinctly elicited. The skin over the abdomen was œdematous; the liver and spleen were not palpable below the costal margin. The urine was high-coloured and so very scanty that on the first day of admission to Gobra Hospital he passed only three ounces during 24 hours. The report of the urine examination is as follows:—

Reaction	..	acid.
Specific gravity	..	1,030.
Sugar	..	*nil.*
Albumen	..	0.2 per cent.

The microscope being out of order the doctor in charge could not look for casts. His stool was sent for examination to the Calcutta School of Tropical Medicine and the following were the findings:—

Hookworm ova	..	found (+ +).
Protozoa	..	*nil.*
Bacteria	..	no non-lactose fermenters found.

The diagnosis of anæsthetic leprosy with cardio-renal dropsy was provisionally made. The patient improved greatly under treatment with Diuretin mixture thrice daily and sodii sulph. ʒiv. every morning. Finally his cardio-renal condition cleared up almost completely and he left hospital a few weeks ago.

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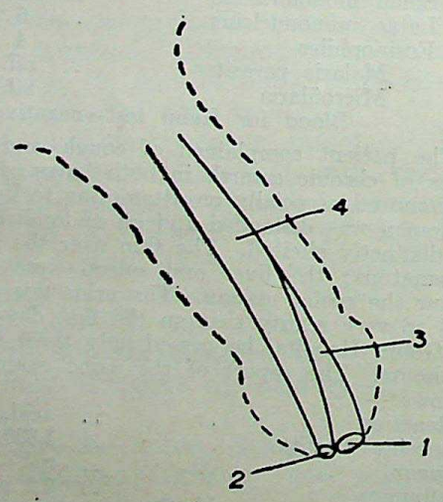
Discussion.—The case as we received it was no doubt in a state of cardio-renal defect but it is very difficult to say at this stage which organ was primarily at fault. His renal symptoms were more prominent but the œdema started in the feet and there was no puffiness of the eyelids. The œdema was out of proportion to the degree of cardiovascular damage that he had. The anæmia was just the amount that one would expect in a case of nephritis but the hookworm infection that he had must also be taken into account. That it is not a case of beri-beri is evident from the absence of family history and the rapid improvement under diuretic treatment. Although no microfilariæ were found in the blood the generalised swelling of the lower extremities with œdema and distortion of the genitalia and fullness in the groins could lead any one to mistake it for a case of filarial elephantiasis.

My thanks are due to Dr. S. P. Chatterji for kindly supplying me with some of the reports of this case, and also to Dr. J. M. Henderson for permission to publish this note.

A CASE OF HYPOSPADIAS WITH DOUBLE CHANNEL URETHRA.

By S. L. BHANDARI,
Officiating Civil Surgeon, Sheikhupura.

ON 23rd April, 1931, G. M., a child, aged 3 years, was brought to the Civil Hospital, Sheikhupura, with the history of having passed urine in a small and broken stream since birth. The urine came out with a lot of straining, and the stream was directed backwards.



1. Meatus.
2. Hole in the frenum
3. The Septum
4. Urethra.

On examination, it was found to be a case of a minor degree of hypospadias, with a normal-sized meatus directed slightly backwards and hooded over by the prepuce. On passing a sound no stone was detected; a good deal of resistance was, however, felt about 1½ inches above the meatus, and was got over with some difficulty. Considering it to be a case of stricture, I dilated the passage up to No. 4 sound and admitted the child for further observation.

Next morning the father of the child complained that the patient was passing urine in exactly the same way, in spite of the big "Sua" (sound) passed the previous day. He brought the child in the act of passing urine. It was discovered that although the meatus was quite open the urine was still coming in an extremely thin stream from a pin-point hole in the frenum. The child was put on the table again, and on passing a probe through this hole it was found to be quite a separate passage opening into the main urethra about 1½ inches above the meatus, from which it was separated by a thin septum. It appeared that the septum was united above with the roof of the urethra and did not allow the passage of urine through the meatus. On the previous day, it was the septum which had offered resistance to the sound, and had been broken through. The urine was still coming through the lower passage as the septum still acted like a valve to prevent its flow through the other way.

The operation.—How to remove the septum was a difficult problem. I thought of the spoke-shave knife for removal of the nasal septum, but it was not in stock.

The following simple device was therefore adopted:—

A director was passed through the meatus with its groove towards the frenum, and a probe through the hole in the frenum. A cataract knife was then introduced with its back along the groove in the director and its edge against the probe. The septum was thus cut in its entire length.

The patient was discharged on the fourth day passing urine in full stream, and quite satisfied with the result.

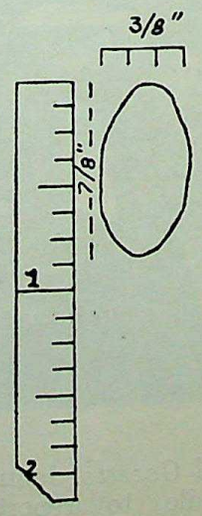
The condition was apparently congenital and appears to be extremely rare. I have not found it mentioned in textbooks of surgery.

CALCIUM OXALATE CALCULUS IN THE URETHRA.

By P. K. KURUP, L.C.P.S. (Bom.),
Medical Officer, Taliparamba.

A MOPILLA male, aged 35, living in the vicinity of Taliparamba, came to me with the following symptoms:—

Difficulty and frequency of micturition, pain on passing urine, extreme irritability of the urethra, and occasional hæmaturia, duration 2 years. The symptoms had become aggravated during the past week.



On examination of the urethra with a probe a metallic click was heard, the diagnosis of a concretion was made, and the calculus was immediately removed. The stone originated in the lacuna magna and the actual size is as depicted herewith. The colour was dark, the surface

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was slightly tuberculated, the consistence was hard, and the shape ovoid.

The specimen was sent to the Professor of Pathology, Madras Medical College, and there it was identified as a calcium oxalate calculus. Such calculi generally cause greater irritability than other kinds of stones of urogenic origin. Stones in the urinary bladder and the urethra are *not* frequent in Malabar where the water is excellent. Even in Coimbatore, where the water is very hard, cases of stone in the urethra are rare. I did not come across a similar case in Coimbatore during my stay of 2 years in the district. Drinking water is an authentic ætiological factor in the production of stones in the urinary passage. Perspiration removes a large quantity of water from the body and it might be a contributory factor in this case. The patient was addicted to severe betel-chewing, a process in which lime is used. He did not go to any distant place where stones are prevalent.

Comment. 1. Stone in the urinary apparatus is rare in Malabar.
2. Calcium oxalate calculus of the urethra occurs in Malabar.
3. Drinking water may be a factor in the causation.
4. The use of lime with betel and ingestion of the juice might be a contributory factor.
5. There was no concurrent stone in the bladder.
6. The patient is all right now.
7. The possibility of a "smegma calculus" was suspected but being a Mopilla who was circumcised this was doubted and hence the specimen was sent to Madras and identified.

A UNIQUE CASE OF ELEPHANTIASIS OF THE LABIA MINORA AND CLITORIS ASSOCIATED WITH PREGNANCY.

By J. M. DAS,

Teacher of Midwifery, Obstetrics and Gynæcology, Campbell Medical School, and Surgeon, Campbell Hospital, Calcutta.

EARLY in July 1929, when I was going round my ward in the Campbell Hospital, my resident medical officer pointed out to me a new case admitted from the outpatient department. It turned out to be a case of almost unique interest both from the point of view of demonstration and of operative technique, *viz.*, a case of elephantiasis of the labia minora with seven months pregnancy. I casually examined the patient and found a huge scrotal-tumour-like mass occupying the vulva and weighing down her young body. The patient was practically unable to walk. I had never met a case like this and on enquiry I find such cases are very rare and only a very few are recorded in the literature. So having this opportunity I spared no pains to give the patient every comfort, to be fit for operation, and to get a living full-term child. I meant to do a Cæsarean section at term and to remove the growth when the effects of confinement were over. I am really proud to say that when she was discharged from the hospital, the patient was absolutely normal. At present she has a live female child.

This case was so unique that I invited first my chief, Lieut.-Col. V. B. Green-Armytage, I.M.S., Professor of Obstetrics and Gynæcology, Bengal Medical College, to see her. He advised me to do exactly what I intended, *viz.*, Cæsarean at term and vulvectomy later on. Major S. N. Mukerji, I.M.S., the then Officiating Superintendent of the Campbell Hospital, took a keen interest in this case. I had also the privilege of reading an account of the case before one of the meetings of the Calcutta Branch of the British Medical Association.

I showed the photograph of the patient with her baby, a photograph of the vulva with the tumour, a coloured sketch of the same, and, most important, a wax model of the tumour taken as a cast from the tumour *in situ* by a former pupil of mine, a student of the Campbell, Dr. Bibhuti Bhusan Roy. I also exhibited photographs of the vulva of the patient after excision of the tumour and of the tumour itself. These are all preserved in the school museum as a memento of this unique case.

The following is the case history as recorded in the hospital record.

Name.—N. D., age 18 years, a young Hindu married woman, was admitted from the outpatient department to my ward in July 1929.

Disease.—Elephantiasis of the labia, patient is pregnant seven months. Fœtal heart sounds quite good.

Personal history.—At the age of 16, patient had bubo and fever (husband gives history of gonorrhœa and syphilis). She was operated on and suffered for three months from the ulcer of the bubo. Patient says that when she was seventeen years of age she started having a white discharge with violent itching, pain and burning sensation over the vulva. There was pain and swelling over the urethra and adjoining parts, the clitoris and the labia minora, and "she felt fleshy growths coming up." Patient had at this time three injections, probably Neosalvarsan.

Shortly afterwards she became pregnant and the growth subsequently enlarged and reached down to such an extent that she was unable to move about freely and to keep herself clean.

Description of the patient's present condition.—General health was exceptionally good. Heart and lungs were normal. Liver and spleen were not palpable. Patient was about seven months pregnant. Fœtal heart sounds were audible. Child was lying in the left occipito-anterior position.

Vulva.—The clitoris and labia minora were involved, compressing the whole pedunculated tumour. The inner edges of the labia majora were indurated and covered with stray warts of the size of lentils. The tumour looked like a pair of hobnailed cotyledons bipartite hanging from a fleshy stalk, the clitoris and vagina were completely covered by the overhanging growth. The colour of the whole surface exposed to view was like bronze, the texture was spongy and moist. The inner side was smooth and glairy with a mucous discharge. The introitus of the vagina was constricted and annular, especially over the perineum. The urethra was retracted and could not be defined.

Treatment and investigation of the nature of the growth.—The Wassermann was found absolutely negative on two occasions; several times the blood was examined for filaria and every time it was reported negative. The patient was kept in bed as much as possible and a towel sling was used to support the tumour. Zinc stearate powder was dusted on freely to keep the parts dry.

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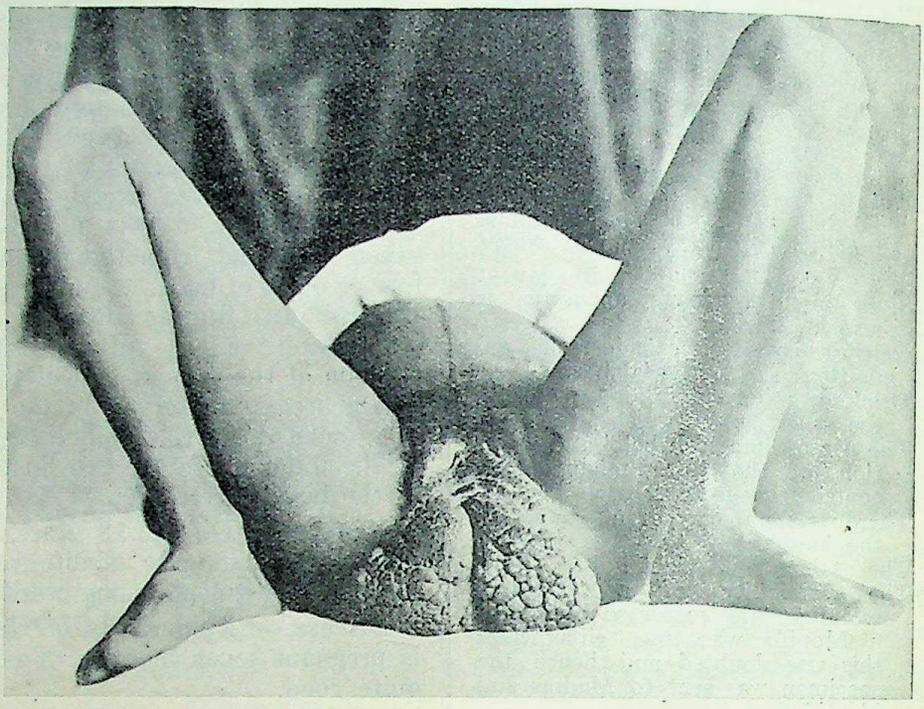
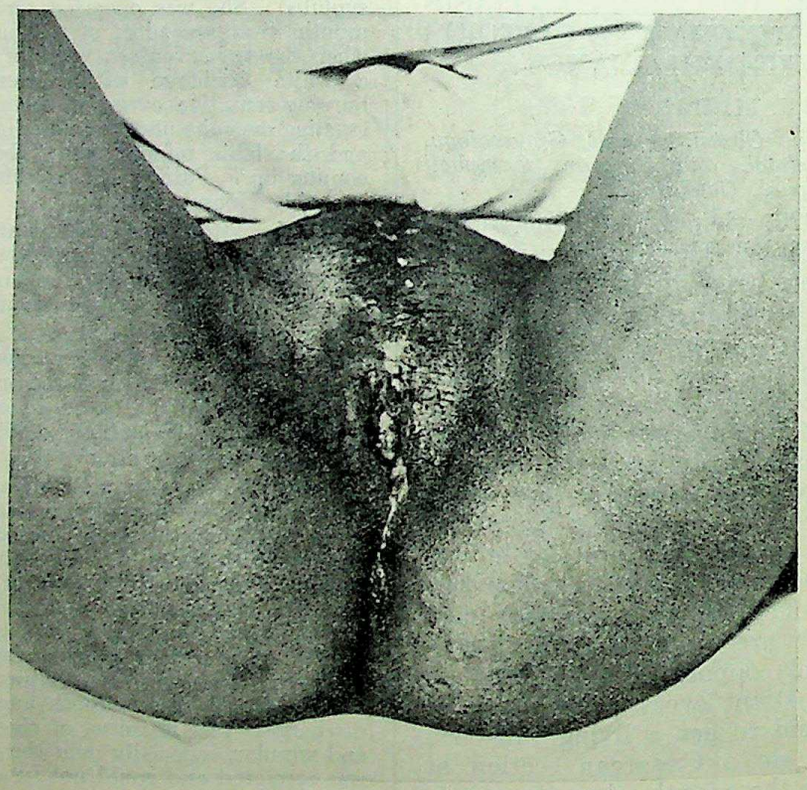
Cæsarean, classical and conservative.—Within six hours of the start of her labour pains I performed conservative Cæsarean section and delivered very easily a female child weighing 7½ lbs. The child cried immediately after delivery. After removing the placenta and membranes through the uterine wound I introduced a self-retaining, T-shaped, one-inch-thick rubber drainage tube through the uterine wound into the vagina—the self-retaining part remaining in the uterine cavity. This was intended to drain the uterine cavity of its lochia; the vulva itself was occluded by the growth. I kept this tube in for four days and then pulled it out. The patient had no difficulty in passing urine and she made an uneventful recovery. I waited for two months by which time the growth had considerably shrunk in size.

Vulvectomy, 20th November, 1929.—Vulvectomy was performed extensively as is done in cancer vulvæ and the whole growth was removed *en masse*. The wound healed by first intention except near the perineum which healed by granulation.

End result.—The patient had some difficulty in sitting in a squatting posture which was soon overcome by massage of the parts, hip baths and exercise.



Condition before treatment.



Condition after treatment.

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The patient left the hospital early in January 1930. The blood was finally examined by the Wassermann test and it was found negative. A few injections of sulpharsenol and bismuth were, however, given.

The follow-up information is satisfactory; but the patient has not become pregnant again.

I wish to take this opportunity of expressing my thanks and gratitude to Dr. Roy for his care and for the free gift of the model to the School.

A CASE OF SPONDYLITIS DEFORMANS (STRUMPELL-MARIE TYPE.)

By MILY. ASST. SURGN. C. D. TORPY, I.M.D.,
British Military Hospital, Trimulgherry.

TROOPER C., aged 25, was being treated in hospital for "lumbago" for the third time. He made no improvement on routine treatment, and in view of the fact that he was a "rough rider" in a cavalry regiment, and had given a history of many falls from horseback, an *x*-ray examination was done, which revealed the much-missed diagnosis, *viz.*, a condition of spondylitis deformans of the osteo-arthritic type.

The condition was characterised by spinal rigidity of gradually increasing severity accompanied by sensory symptoms referred to the lumbar region and the buttocks, with neuralgic pains and areas of hyperalgesia.

The skiagram is quite characteristic showing lipping, bony out-growth, and synostosis of the vertebræ of the lower thoracic and lumbar regions.

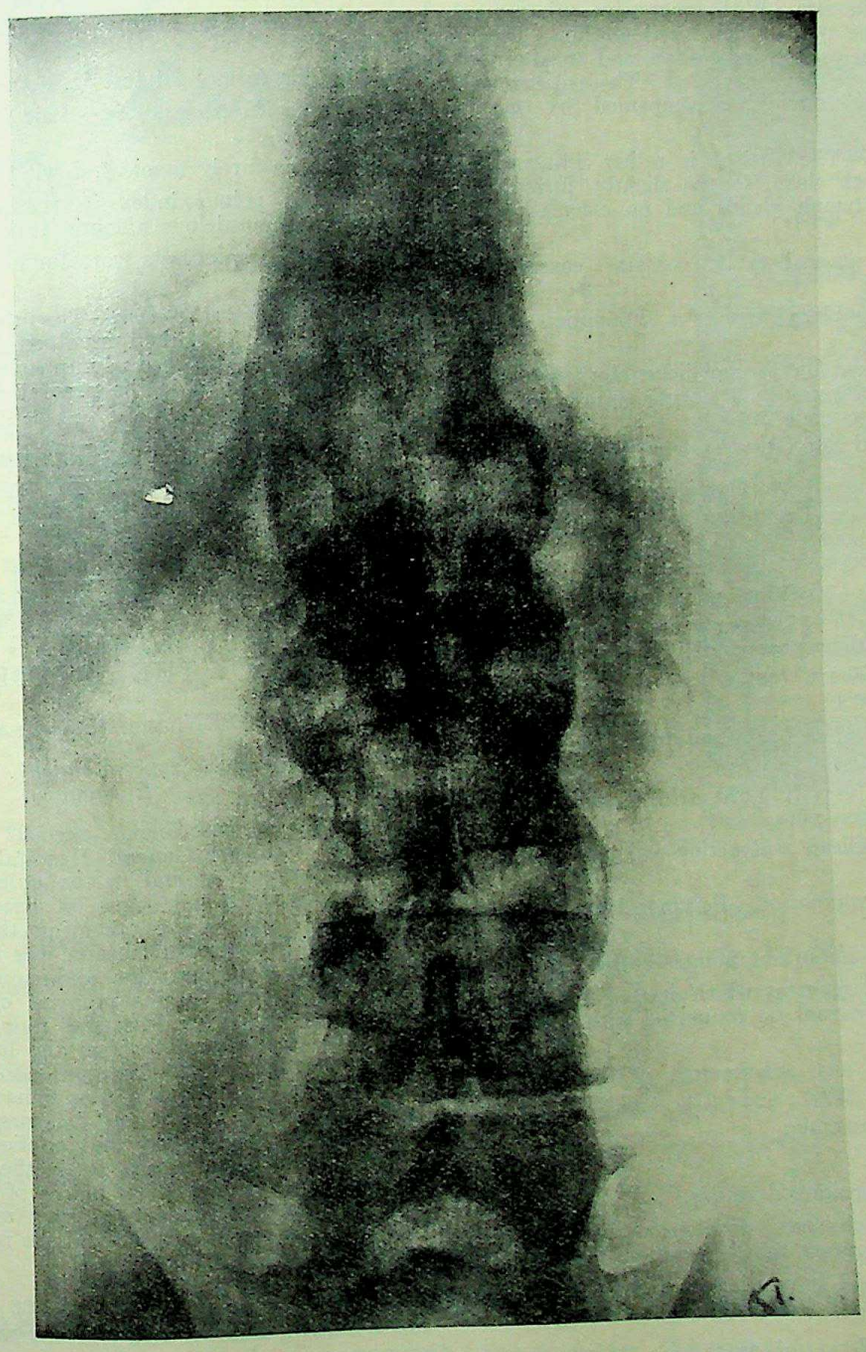
The points of interest in this case are:—

(1) The importance of an *x*-ray examination in cases of so-called "lumbago."

(2) The youth of the patient; spondylitis deformans is usually seen in elderly labouring men.

(3) The condition was obviously of traumatic origin.

My thanks are due to the Officer Commanding, British Military Hospital, Trimulgherry, for allowing me to publish this note.



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A CASE OF BANTI'S DISEASE.

By N. KRISHNASWAMI, L.M. & S.,

Honorary Assistant Physician, Government Hospital, Coimbatore.

P. N., MALE, aged 21, was admitted to hospital on 23rd March, 1931, with the following complaint:—(*a*) Enlargement of spleen—duration 4 years. (*b*) General swelling of the abdomen with indigestion and diminished urinary output—duration 4 months.

Family history.—He is the only son of his parents who are alive and healthy.

Previous history.—No history of any venereal infection, malaria, alcoholism, or dysentery.

History of present illness.—The patient noticed the gradual enlargement of the spleen 4 years ago. Up to the last 4 months the enlarged spleen was present without other symptoms being apparent than those attributable to its size. With progressive enlargement of the spleen the patient developed anæmia. During the last 4 months ascites, indigestion, and an afternoon rise of temperature have appeared. The patient feels a gradual loss of strength accompanied by gastric disturbance.

Physical signs.—The patient is rather ill-nourished and anæmic, teeth clean, tongue slightly furred; no enlargement of lymph glands and no œdema of the extremities.

Abdomen.—Peritoneal cavity contains considerable free fluid.

Liver not palpable. There is a diminution in the liver dullness.

Spleen.—Enlarged up to umbilicus. Its position is superficial. It is firm with a smooth surface and with the notches easily made out.

Circulatory and respiratory systems normal.

Laboratory investigations.

Blood.—No malarial parasites.
Leucopenia.
Poikilocytosis.

Red blood cells—3 millions per c.mm.

White blood cells—3,700 per c.mm. The differential picture shows nothing characteristic.

Hæmoglobin—50 per cent.

Colour index—0.8.

Serum—Negative to Kahn and formol-gel tests.

Stools.—No amœbæ: no ova.

Urine.—Specific gravity 1,020, acid, albumin—a trace, sugar—*nil;* deposits—*nil.*

Ascitic fluid.—Clear. Reaction—alkaline. Specific gravity, 1,010.

Microscopic examination.—Polymorphonuclear cells found.

Diagnosis.—The important points in this case are:—

(1) Splenic enlargement which started 4 years ago. This enlargement cannot be connected with any recognised cause.

(2) Absence of any enlargement of the lymphatic glands.

(3) Secondary anæmia.

(4) Leucopenia.

(5) Extremely prolonged course.

(6) Ascites which has developed recently with indigestion and afternoon febrile reaction.

From these points I have diagnosed this case as one of Banti's disease.

Differential diagnosis.

(*i*) The leukæmic spleen is easily eliminated from consideration by the blood picture.

(*ii*) *Gaucher's splenomegaly.*—This is eliminated because—

(1) It is a rarer condition.

(2) There will be a longer history as a rule. The enlargement begins earlier and progresses more slowly.

(3) Usually there will be a family tendency to this disease.

(4) The patients usually show in this condition a peculiar brownish pigmentation of the skin.

(*iii*) *Splenomegaly of hepatic cirrhosis.*—Careful investigation into the history shows that the splenomegaly has preceded the symptoms due to cirrhotic liver by years.

(*iv*) *Anæmia with splenomegaly of syphilitic origin.*—This can be eliminated because the patient gives no history of any syphilitic infection, and his serum-reaction is negative.

(*v*) *Kala-azar.*—This can be eliminated because—

(1) There is no history of residence in the endemic area.

(2) The formol-gel test is negative.

(*vi*) *Pernicious anæmia.*—This can be eliminated because—

(1) It is rarely associated with an enlarged spleen.

(2) The colour index in the present case is 0.8, whereas in pernicious anæmia it is above unity.

(3) No megaloblasts were found in the blood of the present case.

(*vii*) *Hodgkin's disease.*—Though in this condition there may be a marked involvement of the spleen it occurs in association with lymphatic gland enlargement. This last is lacking in the present case.

My thanks are due to Lieut.-Col. Fraser, I.M.S., Superintendent, Government Headquarters Hospital, for allowing me to report this case which was admitted into my ward.

A CASE OF PENETRATING STAB WOUND OF THE ABDOMEN.

By S. S. SEN, M.B. (Cal.), F.R.C.S. (Edin.),

Assistant Medical Superintendent, General Hospital, Rangoon.

A YOUNG Burmese female, aged 22 years, was brought into the Rangoon General Hospital, suffering from a penetrating stab wound in the epigastric region, with profuse bleeding and signs of internal hæmorrhage. She was taken to the operating theatre immediately and a left paramedian incision was made in the upper part of the abdomen; the abdomen was found to be full of blood which was mopped out. On retracting the costal arch upwards, it was found that the weapon (a knife) had passed through the liver into the lesser sac, and on its way had severed a small subdivision of the right gastric branch of the cœliac axis. The bleeding points were caught and ligatured. Two pieces of omentum were cut away and applied over the wound superiorly and inferiorly, and the ligatures passed through and through these pieces of omentum and the liver substance. The patient was treated in the wards for shock on the usual lines and she made an uneventful recovery.

Comment.—This case serves the purpose of illustrating that if the omentum is used in this manner in the repair of wounds of the liver, it prevents the substance of the liver from being cut through by the ligatures.

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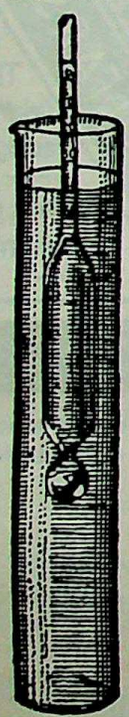

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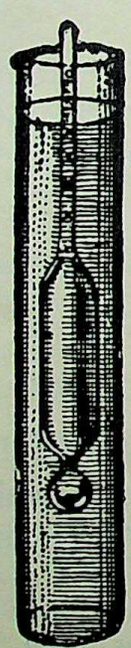

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Indian Medical Gazette.

AUGUST.

THE SPECIFIC TREATMENT OF LOBAR PNEUMONIA.

LOBAR pneumonia is an acute inflammatory disease of the lungs caused, in the great majority of cases, by the pneumococcus or *Streptococcus pneumoniæ*. It is a common disease, and its prominence in the mortality statistics of all countries is the direct result of our distressing inability to deal effectively with it. At different times the pneumonia patient has been bled or purged or poisoned with antimony or alcohol and the results can only be described as appalling.

A new chapter in the history of pneumonia was opened by the investigations of Cole, Avery, Dochez and their colleagues in America and of Lister in South Africa. These workers found that all strains of pneumococci are not identical, as had hitherto been supposed, but that they are divisible by serological methods into a number of types or groups. The American classification, which is that most commonly adopted, recognises three types, I, II, and III, with characteristic immunity reactions, and a fourth type or, more correctly, group, consisting of a heterogeneous collection of pneumococci which fail to react with the type antisera. These important findings were rapidly followed by a large number of observations by workers in different countries on the relative frequency of the types in different epidemics, the virulence of the various types, and the relation of the pathogenic types to the non-pathogenic strains commonly found in the saliva and nasopharynx of healthy people.

From these accumulated observations a number of very instructive facts have gradually emerged. It has been found, *inter alia*, that the types represented, and the relative frequency of their occurrence, are not necessarily the same in different places or at different times. For example, the predominant type of pneumococcus occurring in cases of lobar pneumonia in Edinburgh at present is type II—five years ago it was type I. Pooled American and British figures show that the frequency percentage of the different strains in cases of lobar pneumonia is roughly as follows:—Type I, 33.0, type II, 20.0, type III, 10.0, group IV, 33.0. The fatality percentage for the respective strains is, again roughly, 25.0, 33.0, 45.0, and 15.0. The acute lobar pneumonia of young healthy adults is usually a type I or type II infection; type III is the pneumococcus of the elderly, hence the high mortality in infections with this strain. Lastly, it has been shown that the pneumococci existing as harmless saprophytes in the mouths and throats of healthy people belong in the vast majority of cases to the heterogeneous group IV.

In addition to its importance as the key to these interesting epidemiological findings the serological subdivision of the pneumococci naturally suggested that a new weapon had been placed in our hands in the struggle against pneumonia. A number of large-scale experiments on the therapeutic use of type-specific antisera in cases of lobar pneumonia have been carried out during the past fifteen years, particularly in America, but the results have been, on the whole, disappointing. It soon became evident that effective antisera could be prepared against types I and II only. Type III strains, although they are highly virulent and possess a large amount of soluble specific substance, act very feebly in stimulating the production of type-specific antibodies. Group IV is a heterogeneous collection of biologically different strains, numbering anything from ten to twenty, for which no polyvalent serum has yet been prepared. The additional observation that very large doses of serum had to be given in order to produce any beneficial results, and that, in consequence, undesirable side-effects from serum-sickness were common, led many workers at this stage to abandon this line of treatment.

The next advance of definite value was the discovery by Felton in America that the antibody in pneumococcus immune serum is associated with the water-insoluble-globulin fraction of the serum. Felton devised a method of separating off and concentrating the antibody-containing fraction thus enabling the specific antibody to be given in a concentrated form. It is usual to employ the sera obtained by immunising horses against a large number of different biologic strains of pneumococci and to pool the concentrated antibody from these sera. The resulting product is known as Felton's concentrated refined polyvalent antipneumococcus serum, or polyvalent antibody. Its content of antibody is roughly ten times that of unconcentrated serum and it is freed from many useless, and possibly antagonistic, substances present in the latter. The designation polyvalent applied to this preparation is not, at the moment, strictly accurate, for in addition to a very low concentration of type III antibody there is a complete absence of antibody effective against the heterogeneous group IV.

Aided by these advances in the preparation of pneumococcus antibody, and by the development of more rapid methods of "typing" pneumococci from patients, a number of American workers, in particular Cecil, Blake, Park, Bullowa, and their colleagues, have made a fresh attack on the problem of the serum treatment of lobar pneumonia. From an ever-

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growing mass of observations the following facts appear to be slowly emerging:—

(1) The use of a refined and concentrated specific antiserum is unquestionably of benefit in the treatment of cases of lobar pneumonia due to type I pneumococcus.

(2) There is a general impression in the minds of those best qualified to judge that the same is true, though to a less degree, in cases of lobar pneumonia due to type II pneumococcus; statistical proof is, however, lacking.

(3) In order to be effective, serum treatment must be begun at the earliest possible moment.

(4) The intravenous route of administration must be used.

(5) The most satisfactory basis of standardisation is the Felton unit, which is defined as the smallest amount of serum necessary to protect a mouse against one million lethal doses of virulent pneumococci. Between 100,000 and 200,000 Felton units should be given within the first 48 hours.

In his latest (1928) annual report the Public Health Commissioner with the Government of India draws attention to the fact that there is no special reference to pneumonia as a cause of death from certain of the provinces in which this disease is known to be common. Certain figures are, however, available; during the period under survey two of the most important provinces of India, *viz.*, the presidencies of Bombay and Bengal had respectively 20,991 and 18,557 deaths from pneumonia; in the latter province this disease accounted for 44 per cent. of the respiratory mortality for the year. Among the labour forces on tea estates pneumonia incidence and pneumonia deaths are proverbially frequent; from the report on a group of gardens which has just come to hand we note that the death rate was as high as 6 per mille per annum over a period of 10 years in one garden.

For a variety of reasons the study of pneumonia in India has hitherto been neglected despite the fact that there are certain aspects of this problem, as, for example, the association of pneumonia with the more specifically tropical diseases, which would repay investigation. To mention only one possible line of investigation —if we except the observations of Malone, we are completely devoid of information on the distribution of the different strains of pneumococci in India.

The much bigger question of respiratory diseases in general came up at the last annual All-India Conference of Medical Research Workers. Realising the importance of the subject the delegates resolved that the question of an enquiry into respiratory diseases be fully considered at the next conference. If, as a result of these deliberations, research into lobar pneumonia in India can be undertaken, we shall be in the fortunate position of profiting by the experience already gained by American, and to a less extent by British, workers.

CAPITALS AND ITALICS.

There exists among medical writers, especially in this country, very little unanimity on the question of the use of the initial capital letter. Although it is a matter about which there is room for a division of opinion, there are certain rules which must be observed and, in the interests of uniformity, there are certain precedents which ought to be followed. It must, however, be made clear that the only precedent that it is justifiable to follow is the modern practice in technical journals of good standing published in the same language as that in which a writer wishes his article to appear. That is to say that contributors to this journal should adhere as far as possible to the standards of the best medical journals published in Great Britain. We have avoided saying "in the English language," not because we do not approve of the practices of many of the excellent journals published in different parts of the British Empire outside Great Britain, or even of those of many American journals, but because less diversity of practice will naturally be found in this smaller group; again, we say "less diversity" advisedly, because we do not believe that within any single journal will absolute uniformity be found.

Without any intention of delving into the history of English literature in this connection, we have looked up a few of the older works, of both medical and other writers. In Shakespeare's day no uniformity whatsoever in the matter of initial capitals was observed; writers and compositors appeared to use them, both freely and indiscriminately. In the medical writings of the 17th and 18th centuries initial capitals are still to be found scattered freely, but in the 19th century a tendency to limit their use begins to show itself. The practice has been very much subject to fashion, and the present-day tendency is to avoid the use of capitals as far as possible. Whenever a practice is subject to fashion, extremes will always be found, and in certain publications, in which the ultra-modern effect is attempted, the ordinary use of the initial capital for proper names has been departed from; fortunately, this practice has not yet found a place in medical journals, so that it does not concern us.

Of the two errors, the use of capitals where they should not be used and the failure to use them where they should be used, the former is by far the more common. Speaking from our own experience of the manuscripts sent to this journal, for every "lower-case letter" (to use the printer's technical term for the "small letter") that we alter to a capital, we have to alter at least 10 capitals to lower-case letters.

Leaving out of consideration its obvious uses, such as at the beginning of a sentence, in proper names, and in book titles and headlines, we may say that the main function of the initial capital is to indicate that a word is used in a special,

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and not in a general, sense. This is a very broad generalisation; it does not cover all cases in which initial capitals must be used, and it might well be quoted as the justification for capitals in certain cases where common usage has indicated that they should not be used.

Initial capitals are used when referring to the Deity, directly or by means of a pronoun (*e.g.*, God, His influence), for personal titles or official posts (*e.g.*, Rai Bahadur, Professor of Pathology, Member of the Executive Council, His Excellency the Governor of Bengal), in the names of services and institutions (*e.g.*, Indian Medical Service, Bengal Veterinary College), in the names of places (*e.g.*, North Pole, North-West Frontier Province, Fifth Avenue, Clive Street), in the names of parliaments, legislative and executive bodies, etc. (the Prussian Diet, the Government of India, the Corporation of Calcutta), for the names of societies, official conferences, etc. (*e.g.*, Anti-Malarial Society of Bengal, All-India Research Workers Conference), in the names of communities, denominations, etc. (*e.g.*, Hindu, Baptist, Liberal), for the Acts of parliaments, etc. (*e.g.*, Public Health Act, Sarda Act), in referring to books, journals, and the chapters of a book (*e.g.*, *Manson's Tropical Diseases*, *Lancet*, Elementary Theory of Probability), in the proprietary names of drugs (*e.g.*, Stovarsol, Luminal), in zoology and botany in the names of genera or of any higher orders when referred to as such (*e.g.*, "protozoon of the family Trypanosomatidæ") or when a full scientific name is given (*e.g.*, *Ancylostoma duodenale*, *Bacterium typhosum*).

It should, however, be noted that an initial capital is not given to articles, prepositions and conjunctions associated with capitalized words.

For each of the above-mentioned instances in which an initial capital is indicated a warning note must be given. The word 'god' should not in every instance be spelt with an initial capital, as for example in referring to the gourmand 'who makes a god of his stomach'. The next group presents very considerable difficulties and in many cases it is impossible to be dogmatic. There is little doubt that 'He was appointed Professor of Pathology at the Bengal Medical College' is correct, but on the other hand we should write 'He was a professor of pathology at one of the American universities'. The words 'medical practitioner' can always be written without capitals, but 'medical officer' cannot be dismissed so easily. Principal Medical Officer is an appointment of which the holder is often proud; he does not like to see himself referred to with anything but initial capitals, and his junior officers might resent the distinction if they were not also given a similar honour; nevertheless it is quite wrong to give the words 'medical officer' capitals whenever they appear, though they may be used when a specific post is referred to. For example, 'the railway medical officer was called in', but 'the post of Medical Officer in charge, Simla Mental Hospital, was vacant'. About the next few groups there should be little question; the words 'veterinary college' are printed with small letters unless a specific college is referred to; northern India is not a political division and is therefore given a small 'n'; unless a specific government or society is referred to the word is spelt with a small letter; the capital 'L' in 'Liberal' is only used when the word is meant to indicate a person holding certain political opinions or is used as an adjective with a parallel meaning; in such sentences as 'It is in Manson-Bahr's book on tropical diseases' and 'Finally, in the last chapter, the elementary theory of probability is well described', capitals are not used. With the proprietary names of drugs difficulties again arise; it would be absurd to write 'aspirin' with a capital 'A', and there are many other proprietary names, such as, 'salvarsan', that have come into such constant use that the initial capital is usually dropped. This is a matter in which no hard and fast rules can be made; what is correct to-day may not be correct to-morrow. Each case should be judged on its merits, but the writer of a scientific paper should attempt to be consistent, at any rate throughout that paper. Finally, generic names, such as ancylostoma, bacterium, bacillus, are not given initial capitals except in the associations referred to above.

Our classification of the instances in which an initial capital letter should be used is not, of course, comprehensive but it does, we hope, include the majority of the instances likely to be encountered in medical writings. There are certain words which do not seem to fall under any heading, for example the word 'Nature' when used in the sense 'the pupæ are seldom found in Nature'. A capital 'N' is the common practice. Again the words 'figure', 'graph', 'table' wherever they occur in the text are given an initial capital in many journals, but this is seldom necessary, and in many instances it is very disfiguring to the text. For example, in 'by reference to the graph below', in 'details are given in the following table (VI)', or even in 'it will be seen in figure III', we cannot see that there is much to be gained by obtruding the capitals 'G' and 'T' and 'it will be seen in Fig. III' is definitely jarring. (However, we frequently allow contributors to have their own way in this matter.)

The very worst offenders in the matter of the over-use of capitals are writers of annual reports, especially of public health reports; not only do they fear to offend any of their Medical Officers, Nurses, Health Visitors, Sanitary Inspectors, and even Mosquito Gangs by treating them as they would ordinary doctors, solicitors, and plumbers, but they also seldom fail to give capitals to all diseases, more especially to those which may at any time assume

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epidemic proportions, such as Cholera, Plague and Malaria. The practice, which is now a tradition in these reports, has unfortunately spread and this plague of capitals will be found to have infected all medical literature in India. The name of a disease should not be given capitals unless it consists partly of an unchanged proper name, for example, Addison's disease, Delhi boil, and Pott's puffy tumour. The same rule is applicable to anatomical names and to pharmacological products; you write 'Poupart's ligament' and 'Epsom salts', but not '*L*igamentum *I*nguinale' or '*M*agnesium *S*ulphate'. Another offensive practice is the use of initial capitals in the middle of a sentence in order to denote emphasis. The practice may be excusable in kindergarten books, but it is not so in medical literature. Yet many educated writers indulge in it freely in their manuscripts and are probably quite unconscious that their article, as it finally appears, has been thoroughly purged of these excrescences by the editor.

Italics.—To indicate in manuscript or typescript that a word or letter is to be printed in italic type a single line should be ruled under that word or letter.

Italic type is frequently used for minor headings to sections and paragraphs, for example, '*Summary and Conclusions*', '(*a*) *Morphology*:—We have....', and for the author's designation in the title of a paper, for example, '*Pathologist, Medical College Hospital, Calcutta*', but when words which should be italicized on other grounds (*vide infra*) appear as part of an italicized paragraph heading, they are printed in roman type; *e.g.*, '*The breeding of* Phlebotomus argentipes *in Nature*'.

Full scientific names of zoological or botanical species are always printed in italics, *e.g.*, *Anopheles stephensi* and *Staphylococcus aureus*, and also special names when the generic name is understood, *e.g.*, 'other transmitters found were *umbrosus* and *philippinensis*', here the word '*Anopheles*' is omitted for the sake of brevity, though it would be better to write '*A. umbrosus*', etc., but when the generic name is printed alone italics are not used, *e.g.*, 'a species of anopheles' and 'infected by staphylococci'.

The names of newspapers and journals are always printed in italics, whether they are referred to in the text or under 'references', *e.g.*, *Times of India* and *Indian Medical Record*, and the same rule is usually applied to the titles of books, *e.g.*, *Manson's Tropical Diseases* and the *Medical Annual*. In the first example, Manson is not now the author of the book; his name constitutes part of the title. To take another instance, one would write McCallum's *Textbook of Pathology*, because in this case McCallum is the author.

Foreign words or phrases which have not been fully adopted into the English language and which are used in a sentence without quotation marks are usually italicized, *e.g.*, 'the hernia was reduced *en bloc*', 'the *pièce de résistance* of the book is undoubtedly....', but 'per cent.' 'post-mortem' and 'débris' can be considered almost as English words and are printed in roman type. Indian vernacular words, such as *dhoti, lathi, pan*, should always be italicized; to us they are words of every-day use, but to readers in England and America they are definitely 'foreign'.

In medical literature this rule cannot be applied generally to scientific names in Latin, for example to the names of anatomical structures, disease states, drugs or chemicals, or to scientific names in botanical and zoological classifications, except in the instances mentioned above; thus, abductor pollicis, status epilepticus, tinctura digitalis, potassium iodidi, primordium and the order Amœbæa are not printed in italics, but words and phrases of other foreign languages, such as *main en griffe, rage laboratoire*, and *anlage*, are not true scientific names and, when used in English text, should be italicized.

Finally, it is permissible to use italic type when special emphasis is required for a letter, a word, a phrase, or even a sentence, for example, 'it is spelt histol*y*tica, not histol*i*tica', '....that this drug is a *specific* for malaria, we cannot claim, but that it is *effective* there can be no doubt....', and 'in these circumstances digitalis *must never be given*'. This device should, however, only be used with the utmost moderation. It should be possible by the structure of the sentence to bring into prominence the important words without resorting to italics. The inevitable conclusion to which one is driven by a writer who frequently italicizes large portions of his text is that the rest of his article is probably not worth reading.

Special Article.

THE PRESENT INTERNATIONAL POSITION FOR THE PREVENTION OF BLINDNESS.

By E. O'G. KIRWAN, F.R.C.S.I.,
LIEUTENANT-COLONEL, I.M.S.,
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AT the present time a united attempt on the part of ophthalmic surgeons of all nationalities working in conjunction with the League of Red Cross Societies is being made to grapple with the gigantic task of reducing the incidence of blindness throughout the world, especially in countries in which little is being done in this direction.

According to our present statistics, there are to-day about five million persons in the world who are blind, but this figure falls considerably short of the actual number, and it would be more correct to say that the figure is three times as great; so that the true ophthalmic picture would be represented by twelve to fifteen millions of blind persons rather than five millions.

When it is realised that 50 to 60 per cent. of blindness need not have occurred, it is certainly about time that this united effort should come into existence.

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In India the figure of totally blind persons in the census returns of 1921 gives an incidence of about 1½ per thousand, but the returns for the compilation of vital statistics are inaccurate and unreliable, and according to more detailed enquiry the figure is something like three times the amount of the official census returns given, and must total quite one and a half millions. These figures do not include the partially blind from neglected eye disease; for every totally blind person, there are three persons with more or less damaged vision from neglected eye disease. Therefore, the true ophthalmic picture of India would be represented more accurately by figures showing 1½ millions of totally blind persons and 4½ millions of persons with more or less inferior sight. Of these cases one-third, or possibly one-half, are due to preventable causes.

China, with its population of about 445 millions, has probably a heavier burden of blind people even than India. According to Dr. Lossouarn of the School of Medicine, Tientsin, investigations have proved that half a million blind persons have lost their sight from small-pox alone. This figure represents 35 per cent. of the total number of blind. Xerosis and keratomalacia, trachoma, syphilis and gonorrhœa, and injuries the result of quack treatment are the other commonest causes, in the order given. And for all this eye disease China possesses officially only three eye hospitals. There are forty-eight eye hospitals for the forty-seven and a half million people in the British Isles.

India is certainly better off than China, but still requires an enormous number of more well-equipped eye hospitals. It will be of interest to record a short summary of the efforts that have already been made to reduce the incidence of blindness in Europe and America.

In 1928 and 1929, a provisional committee studied the possibilities of international co-operation for the prevention of blindness and decided that the time was now opportune for a definite movement of international character towards this end.

The International Congress of Ophthalmology took place at Amsterdam in September 1929 and, on its conclusion, the Provisional Committee, along with the League of the Red Cross Society and the American Society for the Prevention of Blindness, convened a meeting, and so was founded the International Association for the Prevention of Blindness in September 1929.

Ophthalmic surgeons of international repute considered that the time had come when a united effort by all nations should be made to start a campaign for the prevention of blindness throughout the world.

In the past history of the prevention of blindness, the first organised attempt was the formation fifty years ago of a society in London for the prevention of blindness, and one of the first tasks of this society was to make known the value of Professor Credé's work on the prevention of ophthalmia neonatorum, popularly known as "babies' sore eyes." The same society, at the fourth International Congress of Hygiene in 1882, offered a generous prize for the best essay on the prevention of blindness. This was awarded to the late Professor Ernst Fuchs of Vienna, and his essay stands to the present day as one of the finest papers on this subject.

In 1903 and again in 1906, American legislation made an investigation into the condition of the blind, and the state of blindness, in the State of New York.

In 1908, Bishop Harman in England established "myopia schools" in which special education was carried out for children suffering from high myopia and defective sight from other causes.

In 1914, the United States National Committee for the Prevention of Blindness was founded; it owes its existence to the energy and philanthropy of Miss Luisa Lee Schuyler. This is a voluntary organisation which has met with uninterrupted success, and now possesses a membership of 25,000, and an income of £28,000 a year; it sets a fine example to the other civilised countries of the world.

In 1928, a Council of British Ophthalmic Surgeons was formed, its task being to assist government departments and other representative bodies in measures for the preservation and welfare of the eye-sight of the community.

In 1922, in England, the Departmental Committee on the Causes and Prevention of Blindness published its second and final report, a work which has been accepted as authoritative throughout the world.

In 1924, the International Association for the Prevention of Blindness in China was formed. In the same year, Dr. Park Lewis, Vice-President of the United States Society for the Prevention of Blindness, delivered an interesting address at the Oxford Ophthalmological Congress, in which he put forward a plea for international co-operation. He stated that the remedy for this social malady is that if the people are to be reached, we must go directly to them, and secondly, a most interesting and gratifying fact is that it is only necessary to tell the story that our eyes might be saved from blindness, to secure the most generous and widespread support for the movement.

In 1925, Mr. Treacher Collins, the Honorary President of the International Congress of Ophthalmology, chose for his opening address the important and interesting international subject "The Elimination of Eye Diseases," and urged that "international co-operation against the common foe, such as disease, is the most likely way to secure international peace."

At the first meeting of the International Association for the Prevention of Blindness at Amsterdam in September 1929, twenty-six nations were represented by delegates from Red Cross Societies concerned with public hygiene, infant welfare, prevention of venereal diseases, and ophthalmology. The following resolution was carried unanimously:—

"After two preliminary meetings held in 1928 and 1929 by a Provisional Committee studying the possibilities of international co-operation for the prevention of blindness, and after consideration by this committee and other interested persons of the report published by the League of Red Cross Societies, the meeting composed of the Provisional Committee and other persons invited by the Committee at Scheveningen, 14th September, 1929, recognises the utility of constituting a permanent organisation. This meeting, placed like the Provisional Committee, under the chairmanship of Professor de Lapersonne, Paris, recognises the formation of an International Association for the Prevention of Blindness."

A strong committee consisting of representatives of the various nations was formed. A series of fifteen articles was agreed upon to define the objects, constitution and procedure of the International Association for the Prevention of Blindness.

The objects of the Association are:—

(1) To study true international investigations into the causes, direct and indirect, which may result in blindness or impaired vision.

(2) To encourage and promote measures calculated to eliminate such causes.

(3) To disseminate knowledge on all matters pertaining to the use and care of the eyes.

The direction of the Association is in the hands of a governing body. The governing body may form from its own members, medical or non-medical, technical sub-committees to prepare and present technical advice upon which the Association may act. For the study of all scientific questions, the majority of the sub-committees must be composed of ophthalmologists. For the general supervision of the work of the Association in the intervals between annual meetings, there is an executive committee composed of the chairman, vice-chairman, and at least five members chosen from different nationalities and able to meet at regular

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intervals. In the articles there is provision for the establishment of a permanent secretariat, the functions of which are:—

(1) To act as a clearing house for all national or local agencies interested primarily in sight conservation.

(2) To provide information to agencies indirectly concerned, which may wish to include prevention of blindness as part of a larger programme.

(3) To collect, evaluate and consider information concerning all public and voluntary activities for the prevention of blindness; to summarise publications, possibly publishing a periodical which may be distributed to all agencies interested in sight-saving; and to issue translations in current languages of material believed to be of value.

(4) To suggest legislation and regulation.

(5) To promote international, national and local organisations dealing with the preservation of sight.

(6) To promote research into the causes of blindness.

(7) To undertake all necessary steps to provide resources for the Association.

The head-quarters of the Association shall for the present be situated in Paris.

The second annual meeting of the Board of Governors of the International Association for the Prevention of Blindness was held on 10th October, 1930, in Brussels. Professor de Lapersonne in his address stated that the work of the Association in the first year of its career had been conducted on three main lines:—

First, the endeavour to find people who were in sympathy with the work and who might help.

Secondly, in the preparation and issue of a world-wide appeal together with plans for the organisation of national committees.

Thirdly, in the study of several medical and social problems which come within the compass of the Association's programme.

Many people had come forward with offers of help, whilst support and approval had been received from different countries. Under the third heading an enquiry had been made into industrial eye accidents by ophthalmologists practising in industrial areas. A report on sight-saving classes for children had been drawn up and presented to various public bodies, and further work in this direction was being carried out. Finally, the Association was represented with voting rights on the executive committee of the Anti-Trachoma League, so that these two bodies would work together without trespassing on each other's sphere of action.

Prevention of blindness in India.—The problem of the prevention of blindness in India presents a huge undertaking, and the first steps that should be taken to face it are education and propaganda which should be carried out by three chief agencies, the first being the large ophthalmic hospitals and subsidiary ophthalmological centres under government control. These hospitals should act as propaganda centres in connection with the prevention of blindness in the province. The public should be educated by lectures, posters, models and pamphlets.

Secondly, preventive as well as curative work should be carried out by missionary agencies, which have done and are doing wonderful ophthalmic work in various parts of India.

Thirdly, by the formation of voluntary associations.

The first association for the prevention of blindness was founded in 1919 by Mr. C. G. Henderson, I.C.S. This has steadily grown in size, and is now known as the All-India Blind Relief Association; it carries out its relief work in different centres of the Bombay Presidency. Its system is essentially one of employing touring ophthalmic dispensaries; the organisation is run on voluntary lines; and an attempt is made to spread ophthalmic relief throughout the rural areas where it is more urgently required. The Association has now a record of twelve years of valuable work behind it.

In March 1930, the Association for the Prevention of Blindness, Bengal, was formed under the presidency of the Hon'ble Lady Jackson, but owing to lack of sufficient finances its work is very limited.

So far as I am aware, these are the only two associations for the prevention of blindness in existence in India. The Madras Presidency is by far the best supplied with hospitals where special ophthalmic relief can be had, and trained assistants can be obtained within fairly easy reach of all areas in the Presidency. The same, however, cannot be said of Bengal, or of the other provinces of India, and so the ignorant public, rather than travel long distances, submit to ophthalmic treatment by the itinerant *hakim*, the *kaviraj* and the coucher of cataract.

The time has now arrived when there should be a properly organised All-India Association for the Prevention of Blindness to grapple with this huge problem of blindness and its prevention in India; this association should have branches in the various provinces of India so that the work of prevention can be co-ordinated.

The International Association for the Prevention of Blindness cannot do much to help us till we in India start to help ourselves. Finance is the first important thing to be considered, and it is unfortunate that the present time is unfavourable for any new financial project, but I feel certain that the necessary money would be forthcoming if national interest could be stimulated. It is regrettable, but nevertheless true, that up to now the spirit of propaganda has been unenthusiastic. One of the most important steps for this All-India Association should be to enquire into the causes of blindness during the first five years of life.

Keratomalacia, a disease now almost unknown in Europe and America, stands out and is first on the list, and is more important than ophthalmia neonatorum as a cause of blindness in India. It is a deficiency disease due to the lack of the fat soluble vitamin A and to the poverty of the Indian peasant, and here the method of prevention is obvious. Better agriculture and an improved dietary will cure keratomalacia.

Small-pox is a disease which is common in India and in which the eyes frequently become involved. The line of prevention is clear; regular enforcement of vaccination and re-vaccination should be carried out. Good vaccination saves more eyes than all the eye hospitals in India put together, according to Colonel Wright, and it is deplorable that the rules and regulations with regard to official vaccination of infants in India are being restricted.

Important on the list of early preventable causes is the application of irritant drugs to the eye in cases of eye disease. These are administered by quacks in the villages of India and it is common to see in the out-door departments of eye hospitals, eyes ruined beyond repair by the work of these travelling charlatans.

Ophthalmia neonatorum is also a cause of blindness in the first five years of life, but it is not of such great importance as a cause of blindness as in other countries. Its prevention is also simple, and can be summed up in substitution of clean midwifery for dirty, and the instillation of ½ per cent. silver nitrate in the eyes of infants at the time of birth.

Congenital syphilis comes high on the list, and again its prevention is simple. Pre-natal clinics, and pre-natal treatment of the mother, would do much to eliminate the disease.

Trachoma varies considerably in its importance as a cause of early blindness in different parts of India, and in different races. Among Bengalis for instance the disease is rarely seen except for those who have contracted it in other provinces. Trachoma should never be permitted to cause the slightest diminution in the visual acuity of a patient if treated from the first, says Colonel Elliot, but the trouble is to get the patient to come for treatment early.

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Cataract and glaucoma may not be preventable and they rank very high in the causation of blindness in India, but much can be done for these diseases as they are both classified under the heading of curable blindness.

THE USE OF PLASMOQUINE IN SUBTERTIAN MALARIA.

A NOTE ON BULLETIN No. 5 OF 1930 OF THE INSTITUTE FOR MEDICAL RESEARCH, FEDERATED MALAY STATES, BY C. RUSSELL AMIES.

By J. W. D. MEGAW, C.I.E.,
MAJOR-GENERAL, I.M.S.,
Director-General of the Indian Medical Service, New Delhi.

THE investigation on the effects of plasmoquine and quinine on subtertian malaria by Russell Amies is of very great interest and importance. It will be read by all workers on malaria, but it contains information which is of great value to every medical practitioner.

The note is divided into two sections:

I. The effect of plasmoquine on the viability of crescents.

II. The effect of plasmoquine on the development of crescents.

In the first section the literature of the subject is reviewed and special attention is called to the suggestions of Mühlens and Cordes that mass treatment with plasmoquine may be effective as a means of malaria control on a large scale.

The more recent findings of Barber, Komp and Whitmore suggest that very small doses of plasmoquine, even single doses of 5 milligrammes, may sterilize the blood of infected persons in such a way that mosquitoes will be unable to become infected by feeding on them.

Carefully conducted experiments by Russell Amies afford strong *prima facie* evidence that two doses of 1/3 grain of plasmoquine, given with an interval of 16 hours between, rendered all the crescents of a carrier non-viable, and also that the crescents remained non-viable for at least three days. He also found that plasmoquine when given every fourth day in doses of 2/3 grain produced the same effects with regard to mosquito infection as the administration of the same dose every day.

The number of cases studied was too small to justify a dogmatic generalization, but at any rate the results obtained are of remarkable interest. If it should be established that small safe doses of plasmoquine will render the patient non-infective to mosquitoes the whole problem of malaria control may enter on a new phase.

Dr. Russell Amies suggests that the treatment of subtertian malaria based on his findings should consist of 20 grains of quinine hydrochloride daily and 2/3 grain of plasmoquine every fourth day. The minimum period of treatment should be ten days but it is preferable to continue treatment for 30 days. He considers that larger doses of quinine, such as 30 grains and over, are unnecessary, but in the treatment of pernicious types the question of dosage must be left to the experience of the physician. He also recommends the use of alkalies as advocated by Sinton.

In the second section of the bulletin he deals with the effect of plasmoquine on the development of crescents and incidentally with the influence of quinine on crescent formation. Contrary to the opinions which have been expressed by some workers he finds evidence that quinine administration has a decidedly adverse effect on crescent formation. Out of a total of 59 patients who were crescent-free on admission to hospital crescents appeared later in the peripheral blood of 21 or 36 per cent. in spite of the fact that the patients were treated with 20 grains of quinine hydrochloride and 2/3 grain of plasmoquine daily for 10 days. But all the patients were crescent-free on the 10th day of treatment and 88 per cent. were crescent-free as early as the 7th day. Four of the patients developed symptoms of slight plasmoquine toxæmia. He concludes that plasmoquine may not prevent crescents from appearing in the peripheral blood, but that crescents in the early stages of development are destroyed. He found no evidence that plasmoquine intensifies the action of quinine on the asexual forms of the malignant tertian parasite.

The actual findings recorded in the tables given at the end of the bulletin are of such interest that it is worth while to analyse them. For this purpose I have prepared the following tables which are self-explanatory. They indicate very clearly that the early treatment of malaria even with comparatively small doses of quinine has a decided effect in diminishing the production of crescents. They do not suggest that plasmoquine has a very prompt action in bringing about the *disappearance* of crescents; but of course this point is of minor importance if it should be established that crescents are quickly rendered non-viable by the action of plasmoquine. Further work on the subject is certain to be undertaken by malariologists, but the possibilities in connection with the combination of small doses of plasmoquine with quinine treatment are of extreme interest and importance. If it should be found possible to reduce the cost of quinine treatment by giving smaller doses and shorter courses, and if at the same time small and safe quantities of plasmoquine will render patients non-infective, it may be practicable to control malaria in infected localities by the combination of quinine and plasmoquine; the cost of such a method of control may in many cases turn out to be much smaller than that of the engineering operations which would otherwise be necessary.

Analysis of all cases from the point of view of the action of plasmoquine in reducing the number of crescents.

	Number of cases.	Average number of crescents per c.mm.									
		1st day.	2nd day.	3rd day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day.	10th day.
A. Cases treated with 20 grains quinine and 2/3 grain plasmoquine daily.	84	55	65	38	32	23	15	9	5	1	1
B. Cases treated with 20 grains quinine only. No plasmoquine was given.	20	12	13	37	23	27	31	26	26	17	7

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Analysis of cases of subtertian malaria reported by C. Russell Amies.

	FIRST ATTACKS ONLY.												
	Total number of cases.	Average days of fever before admission.	Average total amount of quinine taken before admission (in grains).	AVERAGE NUMBER OF CRESCENTS PER C.MM.									
				1st day.	2nd day.	3rd day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day.	10th day.
I. Cases in which no crescents were present on admission. Treated with 20 grains quinine and 2/3 grain plasmoquine daily.													
(*a*) Quinine had been taken before admission.	22	8	23	7	16	15	15	27	14	9	9	..	..
(*b*) No quinine had been taken before admission.	5	6	..	42	38	46	120	118	60	32	24	6	6
II. Cases in which crescents were present on admission. Treated with 20 grains quinine and 2/3 grain plasmoquine daily.													
(*a*) Quinine had been taken before admission.	6	10	23	173	185	135	113	43	28	22	3	..	..
(*b*) No quinine had been taken before admission.	5	11	..	74	172	140	110	42	60	40	6	8	6
III. Cases in which no crescents were present on admission. Treated with 20 grains quinine daily, no plasmoquine being given.													
(*a*) Quinine had been taken before admission.	10	5	19	5	5	4	3	..	..	1	1	1	..
(*b*) No quinine had been taken before admission.	2	7	..	15	30	225	90	150	90	135	165	170	60
IV. (*a*) All cases in which quinine had been taken before admission. I (*a*), II (*a*) and III (*a*).	38	7	22	33	40	31	27	22	13	9	6	..	..
(*b*) All cases in which no quinine had been taken before admission. I (*b*), II (*b*) and III (*b*).	12	8	..	51	93	115	111	92	65	53	40	26	15
ANALYSIS OF ALL CASES—FIRST AND REPEATED ATTACKS.													
V. (*a*) All cases in which quinine had been taken before admission.	80	7	22	25	34	23	18	15	9	6	3	..	..
(*b*) All cases in which no quinine had been taken before admission.	24	10	..	120	126	85	73	53	46	33	26	15	8

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NOTES ON A VISIT TO THE MALAY PENINSULA.

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THESE notes are the result of a short tour through the Malay Peninsula during December 1930. The area comprising the Peninsula presents many interesting aspects of public health. Although conditions differ materially from India, the essential problems are in many instances similar. The notes deal with public health administration, malaria, municipal health administration, and certain aspects of public health activities. It is hoped that they will be of interest to workers in India.

The public health administration of the Peninsula is based on the political position there. There are three separate political entities:—

(1) The Straits Settlements.
(2) The Federated Malay States.
(3) The Unfederated Malay States.

The constitution of these three areas is described shortly below.

(A) *The Straits Settlements* is a British Crown Colony and consists of:—

(1) *The island of Penang and the Province Wellesley*—a small strip of the mainland opposite Penang, to the north of the Peninsula.

(2) *The Dindings*—a few small islands and a small piece of mainland opposite them.

(3) *Malacca*—the town of the same name and a small piece of mainland adjacent to the town.

(4) *Singapore*—an island to the extreme south of the Peninsula; Singapore town is at the south of the island.

(B) *The Federated Malay States* consist of the states of Selangor, Perak, Negri Sembilan, and Penang. These states in 1896 formed themselves into a federation.

(C) *The Unfederated Malay States* comprise the states of Johore, Tregganu, Kelantan, Kedah and Perlis, and are not in the federation but are under British protection.

The colony of the Straits Settlements is directly under the British Crown, which is represented by His Excellency the Governor of the Colony. The seat of the government is at Singapore and a Legislative Council assists the Governor in his administration.

The Federated Malay States are in a federation presided over by the High Commissioner who is also the Governor of the Straits Colony. The nominal head of each state is the Sultan, but in each state is a Resident appointed by the High Commissioner and virtually the administration of the state is in his hands. For the Federated States there is a Federal Council and for each of the states a State Council. The Unfederated States are under British protection vested in the High Commissioner. The five unfederated states have each a Sultan whose policy and administration are guided by a British Adviser, whose advice is usually followed by the state administration.

The medical and public health administration of the Peninsula are based on the political frame-work. The Principal Civil Medical Officer of the Straits Settlements is the head of both medical and public health services with his headquarters at Singapore. He is the technical adviser of the Governor on medical and public health matters, affecting the Straits Settlements. He has at present no official connection with or jurisdiction in the Federated and Unfederated Malay States. There are four divisions of the medical service; hospitals, public health, medical education, and research, which last however is not a separate entity at present and is carried out mainly in the Medical College Department. The large hospitals of Singapore are government institutions and the medical officers attached to them belong to the Straits Medical Service. The Straits Government also maintains state hospitals in Penang and Malacca. Medical officers of hospitals are now recruited direct to the *medical* branch of the service.

The public health side of the Straits Medical Service.

The townships of Singapore and Penang have been formed into municipalities with powers of independent administration and control. The municipal health officers of these towns are recruited, paid and controlled directly by the municipalities of Singapore and Penang and are not members of the medical service of the Colony—their terms of pay and service, provident fund, etc., are entirely under the control of the municipalities. There are two European Municipal Health Officers in each of these towns. The members of the municipalities are all nominated by Government. As stated above however the hospitals in these towns are state institutions, and much of the maternity and infant welfare and venereal disease work has been initiated and is now still, to some extent, maintained by state agency. Outside the municipal area of Penang medical work is centred in the Chief Medical Officer of Penang and Province Wellesley. Similarly the public health work is under the control of a senior health officer. The island of Singapore outside the municipal area of Singapore town is also under a chief health officer, for public health matters. Medical and health officers are also attached to the Dindings and Malacca areas. Outside the municipalities, health matters are dealt with by rural sanitary boards composed of official and non-official members nominated by Government. These rural boards have incomes provided by land cesses and by grants derived directly from Government. Recruitment to the Straits Medical Service has hitherto been made by the Colonial Office in the United Kingdom and has been restricted to Europeans; lately on the advice of the Principal Civil Medical Officer two recruitments have been made from the Malayan Assistant Surgeon branch of the service. This constitutes a departure from accepted custom, but the principle has been approved by the Home Government.

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The Federated Malay States Medical Service is at present entirely distinct and separate from the Straits Service. The headquarters of the Federated Malay States are at Kuala Lumpur. The head of the medical service is the Chief Medical Officer who is the technical adviser of the High Commissioner (through the Under-Secretary and Chief Secretary) in all medical matters. In the Federated Malay States, however, there is now a greater separation of the public health and research services from the purely medical service. (There is no medical school in the F. M. S. The medical college in Singapore serves for all the Peninsula, and the F. M. S. contribute to the cost of the college in Singapore, and have the right of sending students.) Up to a few years ago, recruitment to the F. M. S. Medical Service did not discriminate between the various branches of the service and, after recruitment, the medical officer was drafted to the medical or the public health side as was thought best in the interests of the service. Lately, however, recruitment has been directly into the medical, public health, or research side of the service. Research is concentrated in the F. M. S. Research Institute at Kuala Lumpur which has its director and various sections of entomology, bio-chemistry, chemistry, etc. The hospital service in the F. M. S. is an important branch of the service and is administered by the C. M. O. In Kuala Lumpur are several large government hospitals, paying and non-paying, each with its superintendent who deals directly with the C. M. O. on administrative matters. In each state are district government hospitals, primarily intended for the treatment of government servants, but open to the general public. There are also smaller sub-district hospitals. At district headquarters is the District Medical Officer in charge

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of the district hospital, who once a month visits outlying hospitals. These government hospitals may take in labourers from rubber and tea estates and these are charged for at the rate of 50 cents per day to the company or estate sending them in (*see* note on hospitals later under "Central Board of Health Enactment"). Health matters in the F. M. S. are dealt with by the Chief Health Officer. The C. H. O. is the technical adviser of the Residents of the four federated states on health matters and corresponds directly with them. On matters of policy affecting the whole F. M. S., however, he deals with the Under-Secretary and Chief Secretary through the Chief Medical Officer only, submitting his advice and opinion through this channel. Each state of the F. M. S. has a senior health officer with whom the C. H. O. deals directly on technical matters. The Senior Health Officer is in charge of the health administration of his state. Each state is divided into districts which are the administrative units of the F. M. S. Each district has a number of sanitary boards which are the sanitary administrative units. The sanitary boards of districts, however, do not comprise the whole of the area of the state but are selected areas, usually comprising towns or townships or larger villages, and some of the contiguous areas. Rubber estates, which occupy very large areas of certain states, are not within sanitary board areas, nor are large portions of very sparsely populated areas of the various states. The word "Kampong" is used to denote an area which is not an estate, but is not sufficiently coherent to be called a village, and comprises waste and uncultivated lands, or land sparsely populated containing a house or houses here and there. "Kampongs" are not in sanitary board areas. Sanitary boards are bodies constituted by enactment and possessed of certain incomes and control over expenditure for health purposes. As stated above there are no municipalities in the F. M. S. and large towns like Kuala Lumpur and Ipoh, Taiping, etc., are all constituent parts of sanitary board areas which usually include the outlying areas and villages as well as the towns. The constitution and powers of sanitary boards are constituted by enactment, members are official and non-official and are nominated by Government. The District Officer who is a member of the Malay Civil Service is ex-officio chairman. In each state are a certain number of health officers who are under the administrative control of the Senior Health Officer of the state. The health officers have sanitary charge of a district or number of districts. The health officer of the district is ex-officio a member of the sanitary board. (In Singapore and Penang municipalities, the chairman is appointed by Government and is a member of the Straits Civil Service.) In both the Straits and F. M. S. the non-medical health service comprises sanitary inspectors, health inspectors, conservancy overseers, mosquito gangs, coolies, etc. In the F. M. S. particularly, the system inaugurated in England by the Public Health Act of 1875 of treating the health officer and sanitary inspector as separate entities has grown up. In the sanitary boards containing the large towns (Kuala Lumpur and Ipoh) the sanitary inspectors are Europeans, well-qualified and highly paid officials. They are responsible directly to the chairman of the district board and are not on the health officer's staff. They work independently and without necessarily consulting the health officer. Even in the small sanitary boards in the rural areas the same position exists and the health officer has no direct control over the sanitary inspector who is a Malayan. The staff of the health officer consists of health inspectors, mosquito destruction gang, etc. The work of the sanitary inspector in the rural areas embodies work of a purely medical nature for which medical guidance and control are necessary. The position in England has to a large extent been corrected by the Sanitary Officers Order of 1926, which directs that sanitary inspectors shall work under the general direction of the medical officer of health. The present anomalous position is felt by some health officers and would require consideration and correction, but I gather that the chairman and sanitary board members are by no means agreeable to any alteration. I may mention that the Chief Sanitary Inspector of Kuala Lumpur gets more pay than the health officer at present.

In the Unfederated Malay States, each state acts on its own but each now has a chief medical officer and a chief health officer attached to it who in conjunction with the British Adviser concern themselves with the advancement of medical treatment and public health in the state. There is no co-ordinating or inspecting agency however for these states as a whole, though they are visited from time to time by the Principal Civil Medical Officer or Chief Medical Officer of the Straits and F. M. S. These inspections are informal and done either by invitation by the state or by request of the officials.

Considerable progress has been made in some of the Unfederated States (Kedah for instance) whose rulers are educated and enlightened men. The medical officers of the Unfederated States belong to the Malayan Medical Services, being seconded temporarily for service with the states, which pay their salaries while in their service.

With the retirement of the present distinguished holder of the office of Principal Civil Medical Officer of the Straits Settlements (The Hon'ble Dr. A. L. Hoops), there will be a complete re-organisation of the medical and public health services of the Straits and F. M. S. The service will be combined into one with its headquarters at Singapore. The head of the services will be styled the Director of Medical Services and he will deal directly with both governments on medical and health matters. He will be assisted by a Deputy who will rank next in grade in the service to the Director. Next in grade will be 4 Deputy Directors of (*a*) Hospital and Medical Service, (*b*) Public Health, (*c*) Research and (*d*) Medical Education. These officers will be in administrative charge of the activities of their respective branches and will rank equally in grade. The nomenclature of other officers where it differs in the Straits and F. M. S. will be altered to ensure uniformity.

The financial responsibilities for the services will, as at present, be divided between the two governments. The change of organisation should prove advantageous in many ways. Matters of common interest and policy in the two governments can be dealt with at once and uniformity ensured; geographically, matters of medical administration and public health should be the same in both communities and there has for long been agreement in most things. From the public health point of view however there may be some misgivings that the opinions of the Deputy Director of Public Health may not reach government in the form in which he has propounded them, but may be modified or even withheld. Further the idea of having a Deputy Director of Services senior to the 4 technical advisers seems of doubtful wisdom and I believe that this provision has not yet been definitely decided on.

Having outlined the general line of medical and public health administration, it may be of interest to touch on some of the details of these which struck one as possessing importance and interest.

These may be grouped as follows:—

The measures for the treatment, prevention and control of malaria.

Provision of hospitals throughout the Straits and F. M. S.

Municipal health administration.

Rural health administration.

Water supplies.

Disposal of sewage and nightsoil.

Maternity and child welfare.

School medical inspections.

Malaria, prevention, control and treatment.

Administrative and legislative.—Tin and rubber are the two great industries of Malay, and though tin had

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been worked there for many years, rubber is a newcomer and it is only within the last 30 years that the country has become industrialised in an organised fashion. Rubber was planted some 30 years ago and the tree took so well to the soil that within a short time rubber estates began to cover great stretches of country and the need for labour became urgent. Chinese labour had been employed in the tin mines on piece work; the Chinese did not take to the conditions of work on the rubber estates, where it is difficult to work on the piece-work system, and the Tamil labourer from South India has supplied the great proportion of labour for the rubber estates. The Malayan is essentially a contented agriculturist who likes his own patch of ground; he does not work well in organised labour systems. Malaria was and still is the disease *par excellence* of Malayan labour communities. In the early days of rubber development, it was accepted as part of the environment and it is still recalled how, in the worst seasons, the labour gangs on the widespread estates were followed by rescue parties (who were often also burial parties) to deal with those stricken down in the course of their work. Malaria is now a serious factor on many estates, and would still be everywhere were the conditions preventing it relaxed for even a year or two. It is a universal topic on every estate, and dominates every other medical consideration.

The large influx of Indian labour into Malay naturally attracted the attention of the Government of Malay, of the Madras Government and of the Government of India. The recruitment of healthy coolies and the prevention of introduction of disease on the one hand, and concern for the welfare of Indian subjects on the other, led to legislation and administrative procedures of importance. The Malay Government sent a responsible representative to Madras to superintend recruiting there; conditions on board ship for the conveyance of coolies to Malay were agreed on by both sets of Governments; quarantine camps were instituted in various ports of Malay; while the Governments of India and Madras insisted that the Government of Malay should take steps to ensure reasonable conditions of housing and work, hospital accommodation and medical attendance in case of sickness, and repatriation to India when various conditions outside the coolies' control might necessitate this. To ensure certain of these conditions being carried out the Government of F. M. S. enacted a *Labour Code* in which were laid down rules and conditions for the care of labour forces on estates. Under the Code there was created a Controller of Labour who administered the Code and was responsible that its conditions were fulfilled by estates and managers. Government health officers were required and entitled to assist estates and make suggestions and recommendations in keeping with the Code. The Code laid down certain minimal medical services for the estate labour, *viz.*, hospital bed accommodation of at least 2½ per cent. of the resident labour force was required, of which 1 per cent. should be for infectious diseases. Estate hospitals were to be visited at least once a month by the visiting medical practitioner where there was no resident medical officer, or oftener if the health officer thought necessary. With the rapid increase in the number of estates, it became difficult to inspect the estates to see whether the conditions of the Code were being carried out or not; it became increasingly evident that certain estates were carrying out both the spirit and the letter of the Code, others merely the minimum letter, while others were doing neither. To investigate conditions and to suggest remedies, a commission was appointed to enquire into the health of the estates in the F. M. S. The report of this commission is of great interest and would be of importance and assistance to any similar commission for Indian tea gardens for instance. Its main conclusions were:—

(1) That Asiatic-owned estates are the most unhealthy, and that owing to the lack of health officers, the supervision of these is inadequate.

(2) That visiting medical practitioners had in many instances taken on contracts for too large areas and could not possibly do their work adequately.

(3) That many estates (mainly Asiatic-owned) made no provision at all for medical attendance or for hospital accommodation and many of the smaller estates could not provide the required attendance without compulsion and contribution to some common fund.

(4) That the coolie lines were in many instances satisfactory, though not in many Asiatic-owned estates.

The commission's main recommendations were:—

(1) That the Government inspecting staff should be adequate.

(2) That the "Kampong" areas adjoining estates and not under sanitary board areas should be more definitely inspected and controlled.

(3) That "25 acres" should constitute an "estate" and that the medical arrangements of all estates should be controlled by central and local medical committees.

(4) That a cess should be levied on all estates and that where estates are not permitted to make their own medical arrangements the cess money should be utilised by the committees for this purpose.

(5) That "group hospitals" were desirable and should be instituted everywhere; the grouping to be decided by the Controller of Labour.

(6) That contracts between visiting medical practitioners and estates should require approval of the Controller or of a medical committee; that an estate should be visited at least twice a week, with an examination of the labour force once every 3 months, and that estates hospitals should be visited at least twice a week.

The Commission therefore proposed to strengthen the hand of the Controller of Labour very considerably.

Certain legislation followed as the result of this commission. Under the Health Boards Enactment of 1928 a Central Health Board was established and also subsidiary local health boards. The functions and duties of the local health boards are:—

(*a*) The preparation and carrying out of schemes for prevention of disease outside sanitary board areas.

(*b*) Preparation of schemes of (*i*) visiting of estates and small holdings by a registered medical practitioner, and (*ii*) provision of hospitals and group hospitals for estates.

The function of the Central Board is to direct and supervise the work of local boards and to carry out certain schemes proposed by the local boards.

The Central Health Board consists of 16 members, it is presided over by the Controller of Labour; on it are the C. M. O. and C. H. O. of the F. M. S., the Secretary for Chinese affairs, five members representing planting interests, 3 private visiting medical practitioners, 1 member from the F. M. S. Chamber of Mines and 3 members nominated by Government.

Local board areas are formed as thought necessary by the Resident of each state, and their composition and members are decided by the Resident after consultation and approval by the Central Health Board. It is the duty of the Health Board of the F. M. S. to make proposals regarding the areas which should be made into local board areas. Local boards may form sub-committees for any particular purpose.

As a result of various recommendations and proposals from local boards, the Central Health Board adopted certain standards of medical attendance. They took 500 acres as a suitable "unit." A visiting medical practitioner devoting his whole time to the work could supervise 30 units (15,000 acres). On this basis he should visit and inspect an estate where anti-malarial measures are in operation at least twice a month. Group hospitals should not be more than 12 miles away from any estate in the group. If any visiting medical practitioner has contracted to look after more than 30 units, he must engage the necessary number of assistants or give up his excess contracts. Where estates are not providing the necessary medical attendance they must do so or pay a cess to the Central Health Board which will then be responsible for providing the

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necessary attendance. Similarly for providing group hospitals, cesses have been levied in accordance with approved schemes put up by local boards. Many of these proposals and decisions have been in operation and partially completed, but the slump in the rubber and tin industries has resulted in progress being retarded and in many instances stopped. Much opposition to "group hospitals" has been received from estates who have already estate hospitals. They do not see the necessity for group hospitals, and would prefer still to see existing government hospitals utilised for serious surgical and medical cases. This they say would meet the case. Many estates too they say simply cannot afford medical attendance or hospital provision on the scale recommended and cannot pay the required cess.

At a recent meeting of the Central Health Board it was decided that the standards previously agreed to should be discontinued for the present, and also that all cesses should be similarly rescinded for the time being. The result is that many of the visiting medical practitioners who brought out assistants to help them have had to terminate their services and work is being carried on very much as before, with this difference, however, that the Health Boards Enactment of 1928 did not follow the recommendations of the Estate Commission and strengthen the power of the Labour Controller. It rather transferred his powers to the Central Health Board and the Labour Controller now finds himself divested of much of the power which he held before the 1928 Enactment, while the Central Health Board is itself unable to carry out many of the duties for which it was specially constituted. The present position is therefore disappointing from the administrative health point of view. With the revival of trade, however, which some predict with apparent hopeful certainty from next year, conditions will again be favourable for a resumption of the activities of the central and the local health boards. There is no doubt that the powers given to these bodies conscientiously and vigorously applied will result in a greater control over areas which are at present unhealthy and uncared for. When they function properly, there should be fewer areas in the F. M. S. outside either the sanitary control of sanitary boards or of local boards.

The above represents shortly how the problem of estate sanitation has been tackled in the F. M. S. In the Straits Settlements, the problem is not so pressing as the amount of land under estate cultivation is comparatively small. Malacca has the greatest amount of estate cultivation and there the problem has been approached from a different view-point. In Malacca a "Malacca Agricultural Medical Board" has been constituted by Ordinance XXXI of 1919. This board consists of one member of government, five members nominated by Government, two by the Malacca Planters' Association, and two by the Malacca Chinese Chamber of Commerce. The chairman is the President of the Malacca Planters' Association. The Board levies a cess on every acre of cultivated estate land which is collected by the Rural Board as an assessment. The Medical Board engage a medical staff for the estates in Malacca and this medical staff co-operates with the government medical officer in carrying out the obligations of the Estate Labourers Ordinance of 1911 which is very similar to the Labour Code of the F. M. S. The Malaccan system is regarded as working well and is held by some to be a better system than the one adopted by the F. M. S. It rules out the private practitioner and replaces him by a medical staff directly engaged by the Medical Board created by the Government, a system in the F. M. S. restricted only to estates which are unwilling or unable to carry out the obligations to the Labour Code and the Central Health Board.

Two other boards in the F. M. S. should be mentioned; the Malarial Advisory Board and the Mosquito Destruction Board. The Malarial Advisory Board is as its name implies purely an advisory body. It is composed of the C. M. O., the C. H. O., the four Residents of the F. M. S., the anti-malarial engineer, and two visiting medical practitioners. It considers major schemes put up to it for opinion by Government or the Central Health Board and gives advice on scientific points of anti-malarial policy or administration. It meets three or four times a year.

The Mosquito Destruction Boards function in the sanitary board areas and as the name implies carry out measures directly aimed at mosquito destruction in the sanitary board areas. Its head is the health officer of the sanitary board. Until lately it had its own budget; now, however, it has lost its independence and is merged in the sanitary board, of which it is a sub-committee.

While considering sanitary administration, it may be convenient to mention here the anti-malarial engineer. In the Straits Settlements anti-malarial engineering works, such as subsoil drainage, are carried out in every detail by the sanitary officers, in Penang and Singapore by the health officers and in the rural areas by the Chief Health Officer. These officers have studied subsoil drainage in every aspect and by virtue of study and experience are acknowledged to be experts in it and are left to carry out such work entirely on their own responsibility. In the F. M. S. the post of Anti-Malarial Engineer was created some years ago. He advises every sanitary body in the F. M. S. on all large schemes of anti-malarial drainage, he prepares schemes and estimates on the information from local data and work is completed by the local P. W. D. on these plans. The anti-malarial engineer is under the Director of Public Works and need make no reference to the Chief Health Officer or consult with him in the preparation of any scheme; though such schemes after preparation come up through the usual channel to the C. H. O. for consideration; the C. H. O. may then make criticisms of a general or medical nature, but such criticisms are I understood sometimes not received with a good grace and any criticism or reference to what may be considered "engineering" or "engineering details" is apt to be resented. From what I saw I should say that the system in the Straits Settlements works more efficiently, the work is better done, more mistakes avoided and the results of mistakes are seen and appreciated from the malarial point of view in a way that could not be appreciated by engineers alone.

We were privileged to see a great deal of actual anti-malarial work in the Straits and the F. M. S. We were shown work in Penang town and island, in the town and island of Singapore, the Naval Base, the town of Kuala Lumpur and Ipoh, and rubber estates in the States of Selangor, Negri Sembilan and Ipoh. I visited the following estates, Padan Gaja, Terantang, Old Seremban and Tinah Marah. Our visits to these places were by no means cursory. The health officer and his staff, and the visiting medical practitioners were at great pains to show us every aspect of malarial work; we saw hospitals and hospital records, examined coolies at musters, went over the ground carefully and saw in detail anti-malarial work in progress, completed work, successes and failures. Major Sinton, whose subject this specially is, visited some estates which I did not see; at that time I was being shown matters of general public health interest (water supplies, town planning, infant and health welfare work). The question of funds has not, at least up to the present, been an obstacle in the way of anti-malarial work in the case of government and larger European-owned estates. In Singapore for instance $150,000 is allotted annually for anti-malarial work; on a population basis of 500,000, this works out at nearly 9 annas per head. Similarly in Penang for rural anti-malarial work $100,000 is provided in the budget of the Rural Sanitary Board. The population served here is roughly 100,000 so that the amount per head is nearly Re. 1-8 per annum, a sum greater than the taxation revenue per head per annum in the rural areas of Bengal. A sum of $145,000 is given for anti-malarial work in Province Wellesley and $5,000 for the Dindings. In Ipoh State, Government grants of $200,000 were spent last year on anti-malarial work giving an average

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of $1/3 for anti-malarial work alone. In Kuala Lumpur town alone $1,000,000 have been spent on capital expenditure on anti-malarial work since 1911. The maintenance cost of this works out at something like $30,000 per annum. There are 400 miles of open drains to be oiled every week in the town. Nor has Government money been spent for malaria on purely public purposes alone. To demonstrate the value of subsoil drainage on estates, Ipoh State in 1914 met half the cost of a scheme of subsoiling ($15,000) on a large rubber estate. In 1926 the state met the entire cost of renewing and repairing the system of subsoil drains on the same estate. These facts are mentioned to show the expense of anti-malarial work—an expense which is out of the question for any government, state or public body in India, and within the means of but very few commercial enterprises. The anti-malarial problem in Malay is limited to three anopheline mosquitoes, *umbrosus*, *maculatus*, and *ludlowii*. *A. umbrosus* was first demonstrated as a malaria carrier in Malay by Watson and Strickland. In Malay at present there seems to exist some doubt as to whether it is ever a malignant or extensive carrier. Dr. Howard on one of his estates showed us a place where *A. umbrosus* had been found to be breeding fairly profusely, but had not caused any increase in malarial admissions. On the other hand Surgeon Commander Givin at the Singapore Naval Base attributed an outbreak amongst the labour force there to *A. umbrosus*—the infection having been caught by the men retiring to the jungle for rest during the day-time and being bitten there by *umbrosus*. In another estate where, owing probably to careful and stringent measures, there was no malaria, weeding was given up in the drains surrounding the rubber trees. *A. umbrosus* bred there and 60 per cent. of the coolies got malaria. The economy was only $250 for 2 months and in the 3 months the estate lost $250 by hospital expenses, $250 for plasmoquin and $1,100 in the value of rubber not being collected. Plasmoquine and quinine, and oiling stopped the epidemic in 7 days.

A. maculatus and *A. ludlowii* are the two chief carriers. *A. maculatus* breeds in seepages of clean water anywhere, particularly in submontane tracts and ravines, and *A. ludlowii* breeds in brackish water on the sea coast, in pools not swept by daily tides. Anti-larval methods and the abolition of breeding places have been the methods *par excellence* adopted in Malay. Large books and many articles have been written on these methods as applied in Malay and I will only try to record some special impressions on matters about which I was somewhat vague before my visit. The complexity of the problems that confront us in India in anti-malarial work is absent in Malay. There are no *Anopheles culicifacies*, *stephensi*, *minimus*, *philippinensis*, or *fuliginosus* to contend with. The problems in Malay are comparatively simple and easily understood, the remedies though expensive are not over difficult and, as I have stated, expense has hitherto not been any obstacle, though in the present slump, it is beginning to assume a much more important place than in the past.

Maculatus anti-malarial methods.—*A. maculatus* would appear to be a much more potent vector at present in Malaya than *A. ludlowii*. The presence of a very few breeding places, or even only one seems sufficient to produce malaria in the population residing nearby. (It apparently requires in Malaya a much larger number of *A. ludlowii* per head to make malaria evident in the population.) Seepages and small clear streams in ravines are the usual sites of *A. maculatus* breeding though freshly-dug wells and clear water reservoirs also are found to breed them. The configuration of the Malayan country presents a network of hills and ravines, so that natural breeding places for *A. maculatus* abound and the climate is suitable throughout the year for breeding and malaria transmission. As a matter of fact though cases of malaria occur throughout the year it would appear that the greater number of cases occurred from June to October. The effect of rainfall is interesting. Heavy rainfall may at first lead to a reduction of malarial infections, as the breeding places are flushed out and larvæ carried away; the rainfall, however, results in a raising of the subsoil water, seepages start as soon as the heavy flood is over, and some weeks after there is a recrudescence of malarial cases. Lighter rainfall may cause a recrudescence earlier than heavy rainfall, as there is no scouring out of breeding places, the subsoil water level is raised at once, seepages occur quickly and new crops of *A. maculatus* appear sooner than after a heavier rainfall.

Drainage of some sort, subsoil or open, and oiling are the main methods of attacking the *maculatus* problem. Sir Malcolm Watson has familiarised malariologists with these in his book; Malaya owes him a great debt for his pertinacity in demonstrating the possibilities and the efficacy of these methods often in the face of difficulties.

Dr. Hunter of Singapore has probably the longest and largest experience of anti-*maculatus* drainage and it was appropriate that we saw the work at Singapore first. Long experience has led Dr. Hunter to modify his earlier methods and to lay down certain standards of treatment of ravines that are more economical and more efficient than the earlier methods. The typical Malayan ravine is long and winding with smaller branch ravines coming into it. It is usually broad in its lower reaches, and narrows towards the head. The majority are not steep, but have a more or less gentle fall except at the top where the slope becomes steep and rocky. This type is also found inland, of course, at the foot of the large hills. In the earlier work at Singapore subsoil drainage and plenty of it was considered the ideal. Three longitudinal buried drains were laid down, one central and one contour drain at each lateral boundary, each consisting often of 6 or more 4- to 8-inch pipes. These were laid down at once at the commencement of the work. Later experience has modified this practice in Singapore very materially. Dr. Hunter's treatment of a typical ravine would now be somewhat as follows:—

The ravine is first cleared of trees and shrubs. Then three deep open drains, one central and two lateral (contour), are dug throughout the length of the ravine—these are left *kutcha* for 6 months or so (if necessary, oiling during this period is carried out). The effect of these drains is to lower the average level of the subsoil water throughout the ravine and to get rid once and for all of a large amount of accumulated water. If subsoiling were done straight off, this accumulation might never be got rid of at all and drainage be very unsatisfactory. During this period of 6 months, an opinion can be formed as to the depth necessary for good drainage both centrally and laterally. In the older days, the depths for subsoiling were more or less guessed at and the drains were laid far too shallow—blockages, seepages and washouts were the inevitable results (*e.g.*, old Seremban, 1916 and 1926). Having determined the depth necessary for the central drain, observations are made on the lateral drains (often the subsoil water level has fallen so low with the mere cutting of the 3 drains that the lateral ones are found to be dry even in heavy rains and may simply be filled with stones). Any special seepage points in the lateral drains, especially after heavy rain, are noted for special treatment. The central drain is then graded for treatment—work is commenced from the lowest point upwards and not *vice versa*, as it is used to be done. No gradiant beyond 1 in 30 is permissible; it will wash out. Dr. Hunter now favours an open drain in the centre as much as possible. It should preferably be made *pucca*. Inverts are usually semi-circular but are not joined impermeably—three studs project to keep an open space between the joints. These open joints allow of seepage water from underneath coming into the drain. These are not so necessary if care has been taken to make the drains deep enough. The central open drain is carried up as far as possible even to the head of the ravine; especially

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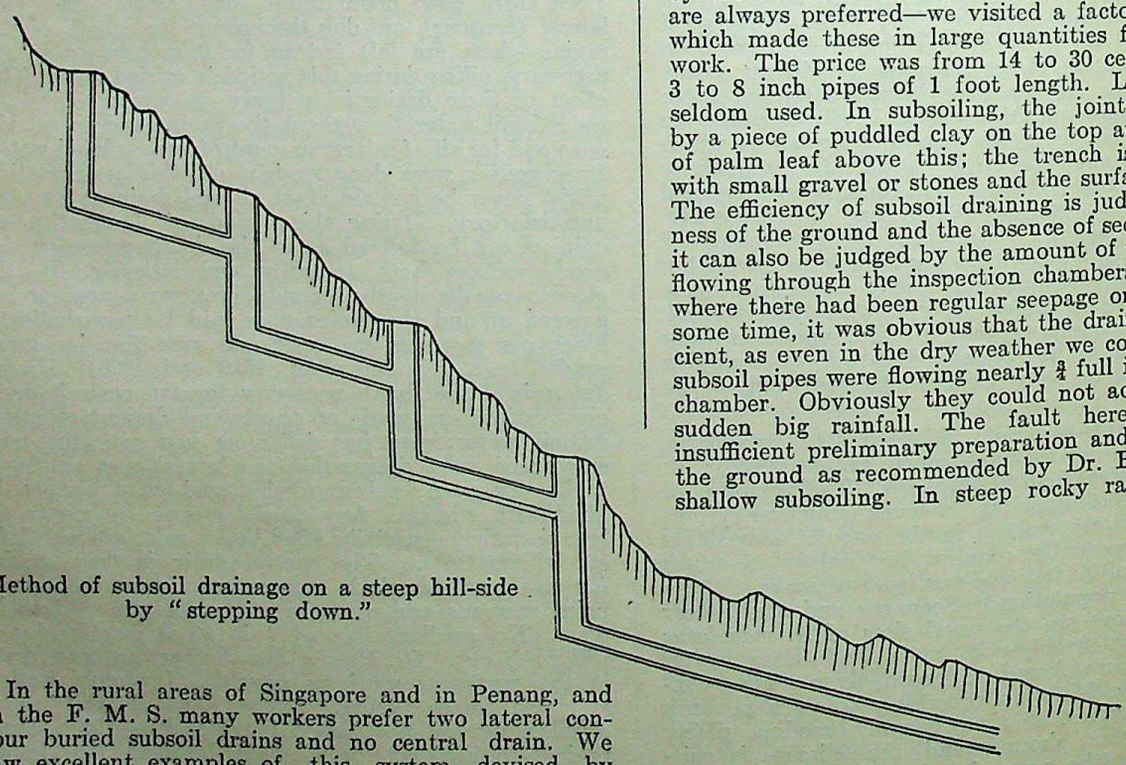
is this done in Singapore where there may be sullage water and effluents from domestic tanks to collect.

The sides of the drain are better riveted with flat earthware slabs, though they may be grassed right down to the invert; weep-holes may be left at intervals between the slabs to aid any excess seepage water to get into the central drain.

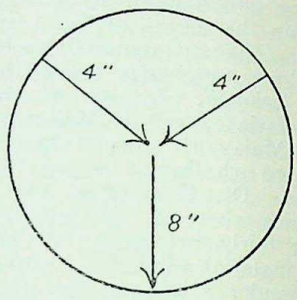
As stated above, the lateral (contour) drains may simply be filled in with stones, but it is usually necessary to treat them in some more detail. It is seldom necessary to lay subsoil piping in them the whole way down each side; this would be wasteful. The special seepage points are noted during the 6 months observation period, and these places are treated by putting in a subsoil drain for a short distance at the site of the seepage and then carrying this straight across by a subsoil drain to the central drain and opening into this at the *lowest possible point, i.e.,* just above the invert. When these special seepage points have been dealt with, the remainder of the lateral drains are filled in with stones. The space between the central and lateral drains is levelled up and then grassed with a laterally spreading grass. (There is a local coarse grass in Malaya called "Lalong" which sends its roots down deeply and will block subsoil drains. This must be avoided.)

No cultivation is allowed on the cleared and grassed ravine space. Severe malarious parts of Singapore have by these means been converted into healthy residential areas, but man's perversity again endeavours to do damage. Hedgerows and trees are planted over subsoil drains and dangerous seepages created by cutting into the hill-side to make tennis courts, etc., and constant watch has to be kept on such areas. The grass on the ravine has to be constantly kept short and a careful lookout kept for any evidence of washouts or seepages. The necessity for keeping subsoil drains protected from tree roots is very well recognised and is a serious difficulty in rubber estates. It is stated that a space 1½ times the height of the rubber tree should be kept clear on either side from the subsoil drain. As an old tree may be 100 feet high, the area to be kept clear is a serious loss to the estate area.



Method of subsoil drainage on a steep hill-side by "stepping down."

In the rural areas of Singapore and in Penang, and in the F. M. S. many workers prefer two lateral contour buried subsoil drains and no central drain. We saw excellent examples of this system devised by Dr. Scharff near Singapore at a newly opened out agricultural project, and also in Penang. The newest bit of work in the F. M. S., however, which we saw at the Leper Asylum, had the central-drain system with lateral connections at selected points. In the 2-lateral-drain system, the drains come together at intervals and then diverge again; at the point of junction is an inspection chamber coming to the surface. The necessity for such inspection chambers is very obvious as this is the only means of finding out where a blockage has occurred, but in the older works they have been left out. All the newer work has a full number of inspection chambers and also at intervals small concrete posts projecting from the ground marking the spot, and the direction and the size of the drain, or drains, under each, as in the figure below. All points of change of direction must have inspection places.



Showing that at this spot two 4-inch drains unite, and one 8-inch drain leaves. The directions are as shown by the arrows.

There are a few details about subsoiling which are of importance. The subsoil drains vary in size from 4 inches to 12 inches. Where larger-sized drains are required, it is the opinion of most that an open drain should be used to take such a large amount of water. In subsoiling one-foot lengths are used, placed end to end with a small gap between the ends. They are laid in the soil without any concrete bed. Concrete pipes were used at first but these were found to be acted on by the acids in the soil. Baked earthware drain pipes are always preferred—we visited a factory in Singapore which made these in large quantities for anti-malarial work. The price was from 14 to 30 cents per foot for 3 to 8 inch pipes of 1 foot length. Larger sizes are seldom used. In subsoiling, the joints are protected by a piece of puddled clay on the top and often a piece of palm leaf above this; the trench is then filled in with small gravel or stones and the surface grassed over. The efficiency of subsoil draining is judged by the dryness of the ground and the absence of seepage after rain; it can also be judged by the amount of water seen to be flowing through the inspection chambers. On an estate where there had been regular seepage on the surface for some time, it was obvious that the drainage was insufficient, as even in the dry weather we could see that the subsoil pipes were flowing nearly ¾ full in the inspection chamber. Obviously they could not accommodate any sudden big rainfall. The fault here was probably insufficient preliminary preparation and observation of the ground as recommended by Dr. Hunter and too shallow subsoiling. In steep rocky ravines especially at the head, blasting is often necessary and stepping down by making concrete wells also. No gradient should be more than 1 in 30. We saw excellent work of this sort at Penang and Kuala Lumpur Asylum.

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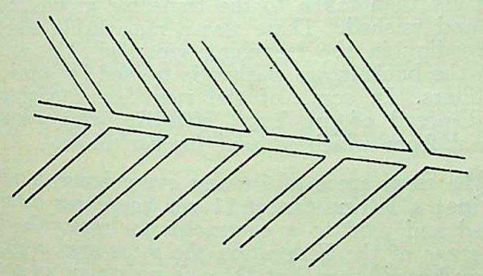
The subsoil water thus collected may be utilised for water supplies and swimming baths, and in the new agricultural project near Singapore it is collected for water supplies and for cattle washing. The very excellent work done by the health department in Singapore and Penang was very striking. The P. W. D. have had no hand in it, the health department make their own surveys and carry out everything themselves or by contract. Subsoiling has been very popular on rubber estates, but is beginning now to be critically examined. It is expensive, its initial cost is high, and upkeep is reckoned as about 5 per cent. of the capital cost per annum. If it is not carefully and expertly done it is disappointing and may be dangerous; further a large amount of land (sometimes 10 per cent. of the estate) has to be kept out of rubber cultivation. Many estate doctors and health officers are coming to the opinion that open drainage should have been used much more; excessive "contouring" has probably been indulged in; open *kutcha* drains will drain a land effectively and if oiled regularly and carefully *A. maculatus* can be controlled; the drains should be narrow and deep, rather than wide and shallow. The surface soil in Malaya stands up wonderfully in narrow drains.

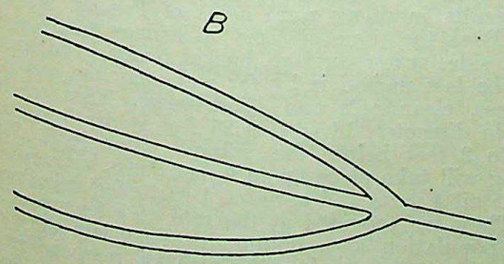
The opinion seems, therefore, to be gaining ground that permanent means against *A. maculatus* are a luxury that can be afforded only by a few at the present time and that temporary drains and oiling offer a much cheaper method of control and, if properly done, are effective. There is no doubt that the permanent works in Singapore and Penang and Kuala Lumpur town are excellent, but the work on the estates was not of the same high order on the whole.

In digging temporary drains which are to be oiled, care should be taken to cut as few drains as possible; herring-boning (A) is not for instance a good method; this means a larger number of drains. It is much better to cut a central drain and two lateral ones (B); the

A



B



drainage is as good, if not better, and the surface requiring oiling is only about one half. Subsoil draining should never be less than 5 feet (4 to 7 feet is the desirable depth). Earlier work was often put down at a depth of 3 feet.

Oiling against *A. maculatus* is popular, well done and effective. The oils used vary. Various mixtures are put on the market by the oil companies; these seem very satisfactory.

The three common mixtures in use are:—

	(*a*)	(*b*)	(*c*)
Solar oil ..	40 parts	45	4
Liquid fuel ..	20 „	15	8
Kerosine ..	4 „	4	52
	64	64	64

This costs about $12.50 per drum of 64 gallons. On the average 0.16 gallon per annum per chain (22 feet) is necessary, using ½ oz. per chain (22 feet) at every oiling. The Four Oaks spray is universally used.

As between oiling and permanent drainage works, some consider that if permanent work can be done for the price of 5 years' oiling, it is worth it.

The ludlowii *problem.*—At present there seems to be some division of opinion on the dangers of *A. ludlowii.* It is regarded as potentially dangerous, but in certain areas comparatively far inland it is found breeding extensively and seems to cause little malaria. On the seashore areas, however, it does not at present seem to be so virulent as it used to be. This is interesting in view of the acute epidemic of malaria at Budge Budge near Calcutta in October and November of 1930 due to *A. ludlowii,* the first such outbreak in India I believe. All are agreed that *A. ludlowii* is potentially dangerous, though it seems to have some periodicity in virulence of infectivity.

The dangerous breeding areas are brackish pools or swamps near the sea which are just outside daily tidal influence. Permanent measures consist of "bunding" (shutting out the tide altogether) and dealing with the area in some manner on the shore side of the bund. The best thing is to reclaim the land by filling; this has been done in large areas in Singapore. If not filled in, the bunded land may be drained by channelling and the channels regularly oiled. Where there is a flow of water towards the sea, tidal gates are installed either automatic or "screw," which prevent the flow of tidal water getting into the bunded area, but allow of an outward flow of water from the bunded area into the sea during the ebb-tide. Bunding is expensive and the dangerous area may be treated by channelling and collecting the water into definite ditches and channels which can be regularly oiled.

In old *ludlowii* areas which have been reclaimed, but not yet filled in, rain water usually leads to breeding of *sinensis* and *vagus* and *Culex fatigans.* Such ground is not, therefore, very dangerous from an anti-malarial point of view.

One of the green algæ, *enteromorpha,* is nearly always found along with *A. ludlowii* larvæ and where this species of alga is present it is almost certain *A. ludlowii* larvæ will be found. *A. ludlowii* may, however, be found in pools without *enteromorpha.*

Quinine and plasmoquin are both being used, the latter especially.

Major Sinton's lectures were very much appreciated and raised interesting discussions. In Malaya they favour longer treatment, and intramuscular injection is popular with physicians. Dr. Amies is experimenting with several estates on treatment with quinine and plasmoquin. Statistically it is very difficult to arrive at definite conclusions as to the amount of malaria on individual estates unless they are either very good or very bad. Spleen rates (in children only—few seemed to pay attention to adult spleen rates), crude death rates, parasite rates, and percentage of absence from muster, and numbers in hospital are the main criteria. In some estates dependents are included for statistical purposes, in others they are not; the state health officers are endeavouring to obtain uniformity. On one

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estate at a muster I found a 60 per cent. spleen rate in children, 55 per cent. in adult men and 66 per cent. in adult women. These were Tamils and Telugus, and these figures showed a comparative absence of any adult immunity, such as one finds in the Santhals for instance. The infective agent here was purely *A. ludlowii*, so far as could be made out. In this estate all coolies absent from muster are seen and, if they have enlarged spleens, are taken into hospital for treatment, getting half a "name" for attendance. In other estates free food is given in hospital, but no "name." Unhealthy estates often attract healthy labour because of the higher pay offered. When the new-comer has worked for some time and got malaria he goes off and then seeks a healthy estate. There is a great turnover of labour and the migration of infected coolies keeps up the infection all over. There is generally a 10 per cent. turnover every month on the majority of estates, a complete change in 1 year.

On one estate for instance the spleen rate was 60 per cent., but for "estate-borns" only 5 per cent.

The average absence rate in healthy estates should not be over 5 per cent. If high, between 20 and 30 per cent., it undoubtedly denotes malaria. This is the best practical index for actual conditions present at the time. The correlation of such higher absence percentage with high spleen index is not as great as might be expected owing to labour migration and quinine treatment. On good estates, all absentees are seen and if they have enlarged spleens and fever must go to hospital. The treatment of children varies; in some estates they are treated only when brought to hospital, in others they are systematically examined and treated.

The spleen index in Kuala Lumpur town is 0.6 per cent. and 80 per cent. in many outside areas. Experiments with plasmoquin tend to show that it is of great use in anti-malarial work in estates, and can keep down malaria to a certain low level, when other anti-malarial measures are cut down on the score of expense.

Dr. Wilson is very keen on mosquito proofing all hospitals.

One arrives at the following conclusions:—

(1) That there is a great deal of malaria in Malaya.

(2) That Government and the best estates have made great efforts to combat it, and have demonstrably succeeded in many places in reducing malaria to a negligible quantity.

(3) That on many estates malaria is still a serious factor in labour despite efforts that are being made to combat it.

(4) That, in rural areas not under sanitary boards or estates, the authorities are faced with the same difficulties in public health administration and practice that we are familiar with in India.

(5) That the methods used in Malaya are narrowed in their scope by the limited number of carrier species that have to be dealt with. These methods even apart from the cost question would have a limited field of application in India.

Other features of health administration and measures.

Municipal.—The differences of administration in the Straits Settlements and in the F. M. S. have already been alluded to.

Water supplies.—The towns have all piped supplies from reserved upland sources. In Penang, water is supplied unfiltered. Its bacteriological purity is not of a high standard, but the *B. coli* present are assumed to be from harmless sources (*e.g.*, monkeys) and chlorination is at present thought to be unnecessary. The gathering grounds are on disintegrating granite and the water is very soft.

The Singapore supply comes from upland sources both on the Island and from the mainland (Johore). The latter supply has been lately installed. Dr. Hunter's excellent anti-malarial work in Johore during the construction of the water-works is well known. There is iron in the water which is removed by aeration. All Singapore water is filtered. In Kuala Lumpur there are several upland sources used as supplies, all are reserved and slow sand filters used. The final bacterial results are not very satisfactory and experiments with Caporite and a Chloronome are being carried out with a view to introducing chlorination. At Ipoh a hill stream is the source of supply and a battery of 49 Bell Pressure Filters treats the water. Alkali ($CaCO_3$) has to be added to the raw water ($\frac{1}{2}$ gr. per gallon), which is very soft, to give precipitation of $Al_2(OH)_3$ with the alum and free lime is added to the filtered water in small quantities also ($\frac{1}{2}$ gr. per gallon). The results are variable and chlorination is under consideration. The C. H. O. of the F. M. S. would like a higher standard of bacterial purity throughout the Federation (absence of lactose fermenters in 10 c.c. is the present standard). He would prefer absence in 100 c.c. He also considers all clear water reservoirs should be covered, and that a 30 days' storage supply of filtered water should be available.

Nightsoil disposal.—None of the towns have complete sewerage systems. Small installations of septic tanks and trickling filters are common in institutions and hotels, and are used in some private houses and groups of private houses. The effluent from these is treated as sullage and discharged into the surface drains. In Penang the nightsoil from congested areas is collected and taken to pail depots where it is discharged into sewers leading to septic tanks the effluent from which is treated by trickling filters and discharged into the sea. A similar system exists in Singapore. Imhoff tanks are in operation there with satisfactory results, but experiments are being carried out with activated sludge. The effluent after filtration is discharged into the Singapore river. Small septic tanks for groups of residences work very well. In Kuala Lumpur and Ipoh the nightsoil is trenched; lorries carrying 80 to 100 buckets are used. The double-bucket system is used; two lots coloured white and red are in operation. The lorries start with clean buckets of one colour and change those for buckets with nightsoil at the latrines. They then come to the bucket washing station. Most of the buckets are only one-third full. At the washing station they are emptied to make a complement of full buckets which are then taken to the trenching ground, brought back and washed. There was a remarkable absence of fly breeding in the trenching grounds. The water in which the buckets are washed is treated by septic tanks and filters. In some of the rural areas nightsoil is also disposed of in large well-like excavations the material from which is used for agriculture.

In the rural areas of Penang every house must have a latrine; a latrine tax of $1 per house *per mensem* is charged and paid to a contractor for removal. In the rural areas of the Federation the same system exists in sanitary board areas, but there is no system of any sort in many outlying areas. The bored-hole latrine is being extensively experimented with and has given very good results in many rural areas of Penang. At the Naval Base the three systems of latrines can be seen side by side: water carriage, bucket removal and bored hole; the last named is by far and away the best for cheapness, cleanliness and effectiveness. They are 16 inches in diameter, 18 feet to 25 feet in depth and go down to 2 feet below the subsoil water level. Fly breeding will take place up to 9 feet down, but a spray of crude oil 4 parts and kerosine 1 part effectively stops this. They are provided at the rate of 1 for every 25 of the population as a minimum. They last about 6 weeks and are closed when the nightsoil reaches 7 feet from the surface; the nightsoil disintegrates and disappears and the same latrine can be used again after a couple of months. A sweeper is absolutely necessary to keep the concrete seats clean.

Destructors for refuse exist in Penang, Singapore, Kuala Lumpur and Ipoh. Some are working satisfactorily and others are old and require a great deal of crude oil to keep them going. A new installation of cells has just been put in at Kuala Lumpur. In Singapore we saw several good types of incinerators for village use.

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Housing.—The houses of the wealthy Chinese in Penang, Singapore and Kuala Lumpur are more like palaces than residences, but they are beautifully designed and built and artistically finished, and the gardens are things of beauty. Surely there can be few lovelier drives than the Shore Road at Penang. Flanked on each side by lovely houses and gardens, with the wooded hill of Penang to one's left, the stretch of palm-fringed tropical beach to one's right, and a vista of blue sea and sky ahead. The Rural Sanitary Board of Penang have adopted a minimum standard for new houses—a house of 2 rooms and kitchen with an out-house and a latrine. The cost is about $250 or $400 for 2 if semi-detached. When Sir Stanford Raffles laid out the town of Singapore he planned intersecting roads and blocks. These blocks were intended to be sub-divided into smaller areas with cross streets. After his time, however, his original idea was forgotten and these blocks were allowed to be filled in solidly with houses of all sorts; as the blocks are extensive a number of insanitary and overcrowded areas were produced and this requires remedy. The blocks have to be opened out again. An Improvement Trust with a capital of $10,000,000 is now operating in Singapore and many of these crowded blocks have been reconstructed and opened up. The trust also reclaims land and converts it into suitable building sites. The "shop house" is a favourite type of Chinese building, shops below and dwelling houses above. Many of the old types are insanitary wooden erections and ill-ventilated. The new types erected by the Trust are excellent, well-built, well-designed and well-ventilated.

Good and bad examples of public buildings exist in Singapore. The Portland Building for instance is purely of Western design and with its numerous rooms on one floor, its complete absence of ventilation, and its absurd basement rooms is absolutely unsuited to the tropics. The Municipal Building on the other hand is simply designed, its long axis is perpendicular to the prevailing wind, its depth is small, as the internal rooms have only partial walls 10 feet high, there is complete through draught, and the building is beautifully fresh and cool.

The public buildings at Kuala Lumpur also are on the whole designed with a view to through ventilation and at the same time are handsome.

The Kuala Lumpur Sanitary Board have erected several model villages for their employees—3 rooms with through ventilation and an outside kitchen. The ordinary rural Malayan house is built on piles off the ground.

"Squatters" are a great problem all over Malaya, and many insanitary *bustees*, both in towns and rural areas, are started by them.

Health welfare centres exist in all the towns and in some of the rural areas of Penang and Singapore. All are run on modern lines and have an excellent trained staff of lady medical officers and health visitors. At some clinics dental surgeons are attached, but there are no eye clinics yet. The centre at Ipoh, for construction, design, arrangement of work and staff, and attendance seemed a model of its kind. The centre keeps in touch with kampongs outside the town and buses are sent to outlying districts on certain days to bring in women and children to the centre. The centres are freely made use of by the Chinese, but the Malayans are somewhat indolent by nature and lacking in energy and enterprise. In many places their numbers are not increasing at anything like the rate of the Chinese. Government does everything to encourage education, industry, and health among the Malayans. Schools for Malayans are numerous; it is to be remembered, however, that Malaya has developed only within comparatively recent years and that 60 years ago there were very few educated Malayans. We spent a very interesting hour or two at the Kuala Lumpur Research Laboratory. I discussed water and food analysis with the chief chemist, the manufacture and testing of vaccine lymph with Dr. Martin and some bacteriological problems. Dr. Simson showed us the manufacture of vitamin A extract tablets. Dr. Green's work on the plasmodium of monkeys was extremely interesting. With regard to beri-beri, the avitaminosis theory is the favourite one in Malaya, but at the Tan Tock San Hospital in Singapore Dr. Lawson showed us many cases of beri-beri; he regards many of the "dry" cases of beri-beri as syphilitic neuritis and considers "wet" symptoms as a *sine qua non* of real beri-beri. The diet for beri-beri cases in hospital contains rice ("Siam parboiled"). Vitamin B pellets are distributed at the health welfare centres; at these there is a series of rice samples labelled "Bad Rice," "Healthy Rice," etc. I think Colonel Acton and his colleagues probably have reversed many of the labels on these!

That high death rates from respiratory diseases point to deficiency in vitamin A in the diet, is the opinion of many of the health officers.

Intestinal diseases.—Enteric fever is common in the towns and has been reported from several rural areas. Dysentery occurs in epidemics as at the Naval Base. The spread of this was due to flies breeding in carelessly-disposed-of nightsoil.

Markets.—The Municipal markets at Singapore, Kuala Lumpur and Ipoh were excellent. Large central markets are now being favoured instead of scattered markets. The New Market at Ipoh has been newly constructed. It consists of 6 large blocks each on its own plinth, lofty and open and accommodating 2 or 3 rooms of stalls. The stalls are off the ground and made of concrete slabs. There is a remarkable absence of flies and dust in Malaya, and this allows a style of market that would not be possible in most Indian cities. Cold storage plants have been installed at Kuala Lumpur for keeping meat and vegetables from day to day; this idea should be capable of much larger use in India.

Quarantine.—We visited the St. Johns Island quarantine station at Singapore and saw the activities of its administration and working. It was empty on the occasion of our visit, but during the first 3 months of 1930 it had accommodated 36,000 people. Migration from China has been stopped meanwhile and Indian immigration is also practically at a standstill during the present slump. The island has been subsoiled and a water-closet system is being installed. Drinking water has to be brought from Singapore.

In conclusion, I would like to thank the Governing Body of the Indian Research Fund Association for honouring me by sending me to Bangkok as their representative to the 8th F. E. A. T. M. Congress and also for giving me the opportunity of visiting the Malaya Peninsula. I feel I have benefited greatly in knowledge, experience and outlook by my visit to the Far East; perhaps I may be excused if I conclude in the words of Ulysses:—

> "Much have I seen and known, cities of men
> And manners, climates, councils, governments."

Medical News.

EXTRACT OF AN ADDRESS BY DR. C. STRICKLAND, PROFESSOR OF ENTOMOLOGY, CALCUTTA SCHOOL OF TROPICAL MEDICINE, TO THE TERAI PLANTERS ASSOCIATION AT BENGDUBI, 22ND JANUARY, 1931.

MR. CHAIRMAN, LADIES AND GENTLEMEN,

I must thank the Association for having asked me again to this annual meeting and I am glad to have the opportunity to say a few words on the subject of the malaria and blackwater which affects the members of the Association. To those who were not here at the time, I must point out that in the cold weather before last I conducted a survey, the report of which will be published shortly, into the incidence of blackwater and

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malaria here in order to see, if possible, whether we could ascertain anything useful in the matter.

With regard to the facts that we elucidated, we found nothing to disturb the old hypothesis that blackwater was in some way connected with malaria. The report will show in some detail how the idea of this connection has been supported by what we found. The saying, "the more malaria, the more blackwater," is true in the Terai.

In malarious countries one is always warned against living close to settlements of the natives, and one of the points we found in support of the hypothesis that there is some connection between blackwater and malaria was that, if a European or a Bengalee lives within one furlong of cooly lines, the chances are 20 to 1 on his developing blackwater.

It is often said that the natives of a country do not get blackwater because they are "immune" to malaria, but that is not true in the Terai because the Paharias, the hill-people, could never by any stretch of the imagination be called malaria-immune, and yet they and the "immune" Madesias, the plains people, equally get blackwater. It is beside the point that neither community is seriously affected.

The next point then is why, if "immunity" be not the reason for the cooly not suffering much from blackwater, should he not do so, and the only reason I can think of is that the cooly habitually fumigates his habitation by his kitchen fire inside his dwelling and that this is sufficient to reduce his malaria infection-rate low enough to protect him.

Another hypothesis which holds the field, though I am afraid we did not investigate it very closely, is that the addiction of coolies to drinking *dawai loupani* saves them from blackwater, but the taking of spirit does not appear to protect the European.

Now we come to the controversial question of whether the treatment of malaria by quinine will induce blackwater in a patient. I have analysed the information that we obtained on this point, and it is irrefutable that of those who took quinine a far larger proportion developed blackwater than of those who did not take quinine.

Recommendations.

Blackwater.—All tea garden doctors are agreed that the introduction of mosquito-proof houses in the tea districts has reduced the blackwater-rate considerably, and all our conclusions support this observation. I earnestly hope then that the slackness one so often sees in the use of this means of protection will become less evident. Electric fans and lights will, I think, help in this respect.

All personal anti-malarial measures, such as the use of mosquito nets, must be attended to carefully.

What should be done about quinine? If you remember the point that blackwater is very severe malaria excited by quinine, should one hold off the quinine treatment of malaria? I would not like to take the responsibility of giving such advice, so the only thing left to do is to make a dead set at reducing the severe malaria-rate.

Malaria prevention.—Apart from the personal modes of prevention one must recommend particularly the destruction of the breeding-places of the mosquitoes.

As I told you last year, nearly 90 per cent. of the malarious mosquitoes are coming from the rivers and streams, and, as I also said last year, unless you tackle these breeding-places, whatever else you may do, you will not do much good.

I think my duty is finished when I have pointed out the source of your trouble, it is for you to devise means to take the matter up. The technical measures, however, will be found in our report and the only remaining matter, the most important, is the organisation. I recommended last year the constitution of conservancy boards for all those with common interests to be protected, *e.g.*, estates along any river like the Chenga which is causing trouble, and I reckoned that the cost of dealing with this would be about Rs. 500 per annum. Of course you need not combine and could each deal with your own parts of rivers, though in this case you would probably have to spend Rs. 750 per annum to get the same result.

I suggested also a supervisor who might be attached to the medical officer of the Association.

THE LEONARD WOOD MEMORIAL CONFERENCE ON LEPROSY.

THANKS to the generosity of the trustees of the Leonard Wood Memorial for the Eradication of Leprosy, an important conference of leprosy workers was held in the Philippine Islands from January 9th until January 23rd of this year. This conference, which followed immediately on the meeting of the Leprosy Commission of the League of Nations held at Bangkok in December 1930, was attended by twenty-three delegates from different countries. The discussions were very largely of an informal nature but practically the whole field of leprosy work was covered and a remarkable degree of unanimity on the main essentials was reached.

The definitions and designations of the main types of lesions were standardised, an improved classification of the types and sub-types of the disease was proposed and adopted, and important data were laid down for the treatment of the disease and for the evaluation of progress under treatment. In the appendices to the main report of the conference are detailed, *inter alia*, the methods of examination of patients, the preparation of ethyl esters of the hydnocarpus group oils, and the data to be collected in epidemiological surveys.

Lastly, it was resolved to organise an international leprosy association the aims of which are:—"To encourage and facilitate mutual acquaintance and collaboration between persons of all nationalities concerned in leprosy work and the co-ordination of their efforts; to facilitate the dissemination of knowledge of leprosy and its control; and in any other practicable manner to aid in the anti-leprosy campaign throughout the world; and to this end to publish a scientific journal of leprosy. It shall endeavour to co-operate with any other institution or organisation dealing with leprosy work."

THE INDIAN HONOURS LIST, 3RD JUNE, 1931.—(*Contd.*)

C.B. (Military).

MAJOR-GENERAL J. D. GRAHAM, C.I.E., M.B., I.M.S., K.H.S., Public Health Commissioner, India.

M.B.E. (Military).

Lieutenant (Senior Assistant Surgeon) A. N. de Gruyther, I.M.D.

Lieutenant (Senior Assistant Surgeon) J. B. D'Souza, I.M.D.

First Class Assistant Surgeon R. C. Gale, I.M.D.

Kaisar-i-Hind Medal (Bar).

H. T. Holland, C.I.E., M.B., F.R.C.S., C.M.S.

POST-GRADUATE LECTURES ON TUBERCULOSIS.

THE Tuberculosis Association of Bengal have arranged for a series of 20 post-graduate lectures and demonstrations on tuberculosis to be given by special workers on this subject. The lectures are being held fortnightly in the Western Hall of the Senate House, Calcutta University, by kind permission of the Vice-Chancellor.

We understand that a large number of medical men are attending the course and evincing a keen interest in the recent advances in this important subject.

The lectures are open to qualified medical men on payment of a nominal fee of Rs. 5 only, which also entitles them to become members of the Tuberculosis

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Association of Bengal for one year. Tickets for admission and the programme of lectures can be had on application to the Honorary Secretary, Rotunda, Writers' Buildings.

AMERICAN JOURNAL OF CLINICAL PATHOLOGY.

THE American Society of Clinical Pathologists, which was formed about nine years ago, have for some time intended to publish their own journal, but there were difficulties; we presume that these were largely financial. We must now congratulate the Society on having overcome these difficulties and issued the first number of their journal.

The first issue contains a number of articles of considerable interest both to the clinician and to the pathologist. There are two papers on agranulocytosis which should be of particular interest to readers in this country on account of the many diseases in which this condition is a prominent feature in the blood picture. There is another on the Schilling count in appendicitis; so the hæmatologist is well catered for. Other articles are on goitre, on the reaction of the meninges to therapeutic serum, on our present knowledge with regard to cancer, and on other subjects. It will thus be seen that the whole field of clinical pathology in its widest sense is being covered.

The journal is to appear bi-monthly and the publishers are the Williams and Wilkins Company. The excellent quality of the format is thus guaranteed. The English agents are Baillière, Tindall and Cox.

JOURNAL OF INTRAVENOUS MEDICATION.

THIS journal, as the name suggests, is to be devoted entirely to the subject of intravenous therapy. The first number appears to be written entirely by the editor. There are sections on the technique of the intravenous injection, on the preparation of solutions for intravenous injection, on a number of drugs which can be given intravenously, and on the treatment of acidosis by intravenous medication. The information given is useful and accurate. The standard of publication, as regards print, paper and the correctness of spelling, is far above that of the average medical paper published in this country. Though we ourselves are not entirely convinced of the necessity for a separate journal for this subject, it is quite obvious that the editor is; we therefore wish him every success in his new venture.

The journal is to be published quarterly, at Jetpur, Kathiawar; the annual subscription is Rs. 2.

THE MEDICAL REVIEW.

WE have received the first number of this new journal which is designed to cater for the especial needs of medical men in northern India. The avowed object of the journal is to further the interests of the medical profession, to publish reports of medical progress, to fight—with the pen—the enemies of the profession, and to act as a guide to chemists and druggists. We should wish success to our new contemporary a little more whole-heartedly had they not included the General Medical Council amongst the enemies of our profession. We sincerely hope that they will devote themselves to medicine rather than to politics; if they do so they will always have our best wishes.

The paper is edited by Dr. Milap Chand Sethi, and is published at Lahore (Railway Road). Price, As. 8 per copy; annual subscription Rs. 5.

Current Topics.

Epidemics.*

Studies in Conditions and Transmission.

(Reprinted from the *Statesman*, Friday, 8th May, 1931.)

SIR JAMES JEANS tells us that man has been on the earth for 300,000 years but intelligent man has lived on it for a few thousand years at most. With the growth of his intelligence and reasoning powers, probably no series of natural phenomena, apart from death itself, has affected man psychologically more than devastating epidemics of fatal diseases. They were the weapons chosen by Jehovah to wear down the hardened heart of Pharaoh. Many plagues are mentioned in the Old Testament. The "Justinian" plague and the "Black Death" are amongst the most vivid pictures we have of Europe of the 6th and 14th centuries. Cholera has circled the earth at various times and spread panic amongst the nations; and epidemics of syphilis, typhus, pneumonia, and influenza have appalled generations of men throughout the ages. The first glimmerings of man's reason were naturally directed to probing the causes of such disastrous visitations; they came insidiously, advanced like a conquering army, dealt havoc and death and gradually retreated. The first conceptions of religion must have been based on these mysterious happenings, the mind of primitive man saw in them the hand of retribution, revenge and supernatural power. The downfall of the Greek and Roman Empires has been attributed to epidemics of malaria and plague; and it is probable that a fatalistic outlook upon life among Eastern nations has not resulted from philosophic speculation but from the apparent hopelessness of generations to ward off or combat epidemics of cholera, plague, small-pox and malaria.

Three main factors.

How much more do we know of the underlying causes and factors of epidemics than our superstitious primitive ancestors? Dr. Stallybrass in his *Principles of Epidemiology* has attempted to answer this question. He points out that there are three main factors concerned, firstly man himself, secondly, the causal agent (the cholera bacillus, the malarial parasite, the unknown cause of small-pox, etc., as the case may be), and thirdly, the means of transmission (close contact, water, food, biting insects, etc.). Each of these main factors may be affected by so many subsidiary causes and conditions, that to investigate, sum up and apportion properly the effect of each, and to arrive at a complete comprehension of the whys and wherefores of epidemic happenings is an exceedingly complex study, and usually a baffling one. Dr. Stallybrass has collected the results of past observation, experiment and opinion and brought them up to date. The result is a book of intense interest, a store-house of information, not the least valuable part of the book being Dr. Stallybrass's original observations and opinions. The range of subjects is wide, and for the specialist intimate knowledge is required of each, but for the general reader certain broad outlines appear clearly.

Hippocrates in 500 B.C. was the first to free medical thought from the deistic conception. "No disease is sent by devils or demons, but is the result of purely natural causes; and each disease has its own and manifest cause." In the production of disease and

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* *The Principles of Epidemiology and the Process of Infection.* By C. O. Stallybrass, M.D. (State Medicine), D.P.H. London: George Routledge & Sons, 1931, pp. 696. Illustrated. Price, 30*s*. net.

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epidemics he laid great stress on the influence of atmospheric and telluric conditions. Many centuries later Sydenham, in the time of Charles I., propounded similar views, and coined the phrase "Epidemic constitution" to define conditions of the weather and the land, and of the population, rendering the latter susceptible to attacks of epidemic disease.

Mosquitoes and transmission.

These "constitutions" recurred at cyclical intervals and were different for each disease. Pasteur's and Koch's discoveries of bacteria as the cause of infectious disease led to concentrated attention on micro-organisms; variations in the virulence and activity of these bacteria seemed to offer an explanation of the periodicity of epidemic disease; but this explanation was soon found to break down in very many instances. Manson's discoveries of the transmission of filariasis by a mosquito focused attention on the "means of transmission" and showed that conditions favouring this had certainly to be taken into account. Susceptibility and immunity in animals and man also are essential pieces of the problem, and the investigation of these has brought some additional light. The study of immunity, however, is concerned with such intimate matters in the structure of protoplasm and protein and with such delicate and ever-changing activities of cell life and function, that the fundamental truths of the mechanism of immunity still elude investigation.

Experimental studies in animal herds initiated by Professor Topley have given much suggestive information and are interestingly described in the book. It has been shown that in controlled herds of mice into which diseased mice are introduced, epidemics can only be kept up by the introduction from time to time of fresh susceptible mice. If no new individuals are introduced into the herd, the epidemic dies out. Applying this practically to human communities, it means for instance that high birth rates and large wide movements of population in a country will encourage epidemic disease. These facts are very true in India and are one of the causes of the high epidemic prevalence in this country. A falling birth rate and a stabilization of population movement by the aggregation of labour in towns will tend to decrease epidemic disease. This has occurred and is still occurring in England.

Epidemiology in India.

The important contributions by Lieutenant-Colonels Gill and Russell to the epidemiology of malaria, cholera and small-pox in India are adequately noticed. Gill, as the result of close study of malaria in the Punjab, concludes that favourable or unfavourable combination of variations in the transmitting agent (the mosquito), and in the susceptibility of the population at risk, are the causes of the rise and fall of epidemics generally. Stallybrass himself would appear to favour the conception of Peter's "Epidemic Potential" which may be defined as the "balance between the infectivity of the causative organisms and the susceptibility of the population." In this it will be observed that the factor of transmission is disregarded as being a much more independent variable, than the other two.

Alteration in the "epidemic potential" is a natural phenomenon occurring without or despite any alteration of the facility of transmission of any disease. An alteration of "epidemic potential" however occurring along with an increased facility of transmission will result in epidemics. The mathematical treatment of epidemics was initiated by Farr in 1840 when he showed the similarity of the epidemic curve to the "normal or Gaussian curve of probability." These conceptions have been extended by Pearson, Ross, Soper, Brownlee, Greenwood, McKendrick and others and a full description of these methods of the analysis of epidemic phenomena is given in the chapter on the "Epidemic Wave."

Value of bacteriophage.

The reasons for the decline of an epidemic are in some respects as puzzling as the reasons for the rise. Here again the author inclines to the view that variations in the "epidemic potential" as defined above determine the decline as well as the rise. Progressive decline in the pathogenic attributes of the parasite and the gradually lessening number of susceptibles have both been assigned values. Lately the dissemination of the bacteriophage by convalescents has been held by d'Herelle and his workers to be the main, if not the only, cause of the decline and disappearance of epidemic cholera in India. The truth is there are so many factors that it is difficult, by reasoning alone, to sum up the effects of each and get a resultant.

Of what benefit has the study of epidemiology been to man? Immense. It has discovered the particular problems in nearly every disease and pointed the way towards the measures of prevention; it forewarns health authorities of conditions likely to lead to outbreaks of disease; it is a study of intensely interesting aspects of nature and of life.

Parasitism, which produces infectious disease, is a fundamental phenomenon pervading biological life; it is to be combated by close study and observation, knowledge and practice on the part of individuals and of collective communities. When man has freed himself from harmful parasites, he will have achieved one of nature's biological ideals. Man will not be satisfied with perfect health alone; but having attained it he will be freer and fitter to strive after other ideals in higher and more intellectual realms.

The book is profusely illustrated by helpful diagrams; the printing and turn-out are excellent. We recommend it to the serious attention of every worker in public health; and at a time when preventive medicine is assuming such a dominant note in public life, there must be many workers in other fields, official or otherwise, who will find chapters of the book of great help both in their duties and in the study of everyday life.

A. D. S.

Epilepsy.

By DAVID ORR, M.D. (Edin.).

(Abstracted from the *Prescriber*, Vol. XXV, No. 4, April 1931, p. 127.)

EPILEPSY is not easily defined, nor can a simple clinical and pathological conception be given. The symptoms are far from uniform and not easily recognized in many instances. There are numerous clinical varieties and combinations of phenomena.

Some writers would exclude the Jacksonian type on account of the absence of disturbances of consciousness; others again tend to include too much. The important point to recognize is whether the essential fact in epilepsy is a more or less profound disturbance of consciousness, or merely a sensory-motor fact.

Should convulsions without disturbance of consciousness, and amnesia, be excluded, or are we to include the "tics"? A wider conception of epilepsy would certainly include the latter in which the psychic characters of epilepsy are often very marked.

Jacksonian epilepsy cannot be excluded, as frequently it is the precursor of classic epilepsy; that is to say, the beginning of a discharge which passing along the association paths leads to general convulsions.

The pathological significance of the nervous discharge or explosion lies not in the partial or general convulsion, but in the functional disharmony and dissociation produced in the various cortical centres. Regarded in this light, the "tics" appear of the same nature as a convulsion—motor-cortical discharges, outside the control of subordination and association. It would seem as if, in an epileptic, the anatomical structures do not provide a ready means of communication between the various functional cortical groups, so that tension

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in one not being discharged to others passes out through the effector systems which are phylogenetically more pervious.

The psychic disturbance, always present except in symptomatic epilepsy, is the epileptic character. This may be inherent or acquired.

In the physiopathological sense the basis of epilepsy seems to be a hyperexcitability of the cerebral cortex, which differs in individuals, owing to some inherent condition of the central nervous system. As yet we cannot define what exactly this hyperexcitability is; and it is interesting to note that it can be present in the sensory zones also.

The psychic disturbance, which is more usually original than acquired, often shows in childhood in the form of obstinacy and bad temper. There is frequently also a history of nocturnal twitchings, distressing dreams, and somnambulism. These may disappear, but if they persist may develop into an egotism difficult to correct. In adolescence a criminal type of character may show itself, along with lack of adaptation, preponderant individualistic instincts, cruelty, hate, vagabondage, evil living, irascibility, and marked tendency to impulse. Such individuals are difficult in school and may have to be sent away.

At a later age the epileptic character undergoes modification. The individual becomes solitary, and avoids company. He may be ostentatiously religious, and though his attitude may suggest diffidence and humility, there is an underlying irascibility and a cruel nature.

The key-note of the epileptic temperament is the tendency to anger and impulse; inhibitory power is little developed, and the desires may be violent and obstinate.

There are defects in association; the sense of inferiority as compared with others is much in evidence; and on the slightest provocation the epileptic is subject to explosions of bad temper of a destructive and brutal nature. Vanity is prominent, and the entire psyche mobile and explosive. Intelligence is subnormal, there is defective power of concentration; memory is weak, ideation variable, and along with those defects there exist ideas of grandeur, of persecution, and a high degree of selfishness. Epilepsy and inferiority are synonymous terms.

Epileptic excitement.—In addition to this epileptic temperament, diverse forms of psychoses may arise. These may be classified as mania, stupor, sensory delirium, and paranoia. But in the majority of cases there is a direct relationship between the convulsion and the attack of insanity, which may precede, follow, or take its place, the latter being termed an "equivalent." Considered in relation to the convulsive attack, the psychic disorder may therefore be (1) pre-epileptic, (2) post-epileptic, or (3) equivalent epileptic or larval.

The pre-epileptic attack consists in an exaggeration of the epileptic character; the patient becomes more querulous, excitable, provocative, violent, impulsive, loquacious, and threatening. There is great restlessness, with loss of appetite, hostility, broken sleep, terrifying dreams, and at times suicidal tendencies. In certain cases hallucinations and delirium appear, visions are seen, insults are hurled at them, voices from Heaven condemn them, and various commands with a religious content are experienced. Olfactory hallucinations, too, are frequent; and with all this psychic disturbance there is much psychomotor restlessness, impulse, rage, and malignancy, giving rise to false judgments. Erotic tendencies are very strong; and whatever may be the psychic disturbance, the convulsion follows.

Post-epileptic insanity.—After a seizure the patient wakes up, and is confused; the gaze is wandering, and movements are slow, torpid, and automatic. The patient seems to be in a dream. The speech is stammering and disconnected; headache is complained of. Then gradually the mind clears, people and places are recognized, but there is complete amnesia for the period of time just antecedent to the attack. There is a short period of irritability before the normal is regained.

In other cases a hallucinatory delirium may supervene, accompanied by violence and destructive attacks, or by attempts at suicide.

In *equivalent* or *larval epilepsy*, the mental disturbance is short and rapid, with profound confusion and amnesia without any antecedent convulsion. Here there has been simply a substitution for the convulsion.

Frequently after an attack the patient may be found wandering in some other locality without any knowledge of how he arrived there. This is termed a "fugue." Frequently also automatic acts of an indecent nature are performed quite unconsciously; and occasionally the equivalent may show as an attack of tachycardia, or an obsessive act of violence.

Protracted states of confusion are not infrequent (crepuscular). In these the confusion may last for many days or months, followed by convulsions. In such cases the confusion is very profound and judgment erroneous, while illusions and hallucinations develop slowly. Association is slow and false, the delusions are fleeting, or may become paranoid (fixed); there may be grandiose ideas, and delusions of persecution, while stupor and loquacity alternate. There is often a tendency to verbigeration and paraphrasia. Later, the memory for events spread over a prolonged period is much confused, and the return to normal very slow. Such an attack may pass straight on to dementia.

Functional disturbances.—Spastic hemiplegia, diplegia, strabismus, homonymous hemianopsia, and alterations in sensation, are to be noted. Speech is usually slow, somewhat explosive, and the tone is heightened. The voice is monotonous. In the post-epileptic phase one often finds word-deafness, word-blindness, and echolalia.

On the physical side of the disease one finds rapid and wide changes in the elimination of phosphoric acid, due to functional hyperactivity of tissue chemistry.

Ætiology.—In regard to the ætiology of epilepsy very little is known. Heredity is undoubtedly a strong factor and next in importance comes alcohol. The toxic theory is not supported by sufficient evidence, and much the same can be said for any other theory hitherto advanced. It seems probable, however, that epilepsy is due to some alteration in the metabolism, which produces a deviation in normal evolution and irritates the nerve cells.

The pathological anatomy is very obscure. Asymmetry of the brain has been observed along with a simplicity of convolution pattern and sulci. Some brains may show old destructive foci, and tumour growths may be present in a small percentage of cases. At post-mortem it is not unusual to find thickened meninges, sclerotic areas in the cortex, or rarely porencephaly.

Diagnosis.—The diagnosis of the disease depends on (1) the rapid onset of the psychic disturbance; (2) the profound change in consciousness with psychomotor automatism; (3) the early remission of the phenomena with complete or incomplete amnesia of events during the attack; (4) marked somatic anomalies, such as obliquity of the cranium and other malformations of the head; (5) the presence of residua of old cerebral disease, for example, infantile spastic hemiplegia, or strabismus.

Prognosis and treatment.—The prognosis should be very reserved. In regard to treatment one must still rely upon the bromides. The dose of these must be adjusted to each case as regards age and body-weight. The best effects are obtained when all chlorides are omitted from the diet, and it is found that when this is done bromides act far better and less are required. Not only so, but tendency to bromism is much lessened. The bromide can be used as a dry "table salt," instead of sodium chloride, with meat, eggs, etc., and it is perhaps best to use sodium bromide. Medinal and luminal have in recent years been much used and deservedly so. The effects are quite good, and if luminal is used the drug will dissolve readily in water

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when a pinch of sodium bicarbonate is given along with it.

The old-fashioned seton in the neck is worthy of a trial in some cases of an obstinate nature, and in all cases sources of reflex irritation should be sought for and if possible removed.

Everything should be done to lighten the burden of this terrible affliction both to the sufferer and to his friends.

Serum Treatment of Pneumonia.

(Abstracted from the *International Medical Digest*, Vol. XVIII, February 1931, No. 2, p. 122.)

ONE of the most interesting and most perplexing studies attracting the attention of investigators in recent years is the finding of an effective serum for the treatment of pneumonia. There have been many obstacles in the way, chief of which is the fact that the pneumococcus has many types and these types show seasonal variations in virulence. The first sera prepared were so low in antibodies that very large amounts were necessary to be effective. Therefore the reactions were so frequent and sometimes so severe that most clinicians abandoned use of the sera.

From time to time progress in the development of such a pneumonia treatment has been reported in these columns, and now it is interesting to note that recent contributions indicate substantial advance in the study. No name has been more consistently associated with this progress than that of Dr. Russell L. Cecil, whose reports we have now and then reviewed. His most recent conclusions formulated from a study made in association with Dr. Plummer, seem to justify the confidence in the possibilities of the serum treatment of pneumonia which we expressed two years ago.

Huntoon made the first effort to overcome the lack of concentration objected to in the former sera when he produced a solution of antipneumococcal immune bodies obtained from types I, II and III. This solution was almost entirely free from horse serum. But after two years' use by Cecil and other clinicians it was found to be no more concentrated than the earlier sera. About this time Felton and Dougherty demonstrated the possibility of increasing or decreasing the virulence of pneumococci for mice by an *in vitro* method.

From information elicited in these studies Felton endeavoured to isolate the substance so antagonistic to virulence, and as a result of his experiments it was determined that this protective substance was at least associated with, if not wholly in, the water-insoluble part of the serum, namely, the *globulin*. A protective power was then found in globulins prepared by the carbon dioxide method, but the yield, as was the case in Huntoon's experience, was never more than half as great as the original serum from which it had been precipitated. Then, while making these studies with carbon dioxide as a precipitant, Felton noticed that a very heavy precipitate was formed in antipneumococcus serum when simply diluted 1 : 10 in water, and that it was much greater than that precipitated by the carbon dioxide method. In this way he was able to isolate and concentrate a substance in larger quantity which phagocytized virulent pneumococci *in vivo* and *in vitro*. He was also successful in decreasing the virulence of pneumococci with solutions of this substance. In further tests to determine whether the substance was bactericidal in whole blood there was found a marked retardation in growth in all specimens, and bactericidal action in some.

Cecil, one of the first to use this serum, has made a consistent study of it since his first report seven years ago. He has collected a series of 3,662 cases of pneumococcus pneumonia in adults and 271 cases in children.

At the outset of the work Cecil tested the therapeutic value of Felton's serum on monkeys experimentally infected with pneumococcus type I pneumonia. Four monkeys were given lethal doses of pneumococcus type I intratracheally, and all four animals promptly developed pneumonia and pneumococcus bacteriæmia. Twenty-four hours after infection, three of the monkeys each received several intravenous injections (from 5 to 10 c.c.) of concentrated serum. These three monkeys showed almost immediate signs of improvement, and pneumococci disappeared from the blood stream. The fourth monkey did not receive any serum and died on the third day with a heavy pneumococcal septicæmia.

In his investigations with Felton's serum Cecil used the alternate case method:

Every patient diagnosed as having lobar pneumonia was given a number. The patients with even numbers received the serum; those with odd numbers served as controls. After a preliminary test for sensitiveness to horse serum, 5 c.c. of concentrated serum were slowly injected intravenously. From one to two hours later, between 10 and 20 c.c. were given intravenously, the dosage depending upon the potency of the lot and the severity of the case. In general, Cecil tried to administer from 100,000 to 200,000 units (from 40 to 100 c.c.) during the first 24 hours of treatment. It is his present conviction that in most cases serum treatment should be completed in 48 hours; that is, if results are to be obtained within that time.

Cecil says there is no more striking clinical effect in the whole domain of specific therapy than that which frequently follows the early administration of Felton's serum in type I pneumonia. The temperature drops rapidly, very much as in a natural crisis, and all signs of toxæmia frequently disappear within 24 hours after the initiation of treatment.

The effect of concentrated serum on pneumococcal septicæmia is quite as marked as that of unconcentrated serum. Unless the sepsis is extreme (several hundred colonies to 1 c.c. of blood), pneumococci disappear from the blood stream after one or two injections of serum.

The effect of concentrated serum on the mortality rate of type I pneumonia is indicated by the following results: Altogether, 239 cases of type I pneumonia have been treated with Felton's concentrated serum, with a death rate of 20.1 per cent.; 234 alternate controls show a death rate of 31.2 per cent. It is noteworthy that in the 4-year period the death rate of the treated cases has varied from 17.7 to 22.9 per cent., and for the controls from 26.3 to 39.4 per cent.

The favourable results obtained at the Bellevue Hospital with Felton's serum by Cecil and his associates have been fully corroborated by figures reported for the Harlem Hospital in New York by Parke, Bullowa and Rosenbluth. One hundred and nine cases of type I pneumonia treated with Felton's serum showed a death rate of 17 per cent., while 105 controls had a rate of 31 per cent.

It is interesting to note that to some extent these experiences have been supported by papers from Scotland which have appeared recently in the *Lancet*. Both of these papers indicate that the serum was given to every second case of lobar pneumonia admitted over a period of 10 weeks; the cases so treated were with the alternate controls, as Cecil has done. The Scotch physicians believe that their results show the serum to have a definitely remedial effect in both types I and II. Apart from the lower mortality, it was noticed that half the serum cases had their crisis on or before the fifth day, and certain cases seemed to be more comfortable for their treatment although their illness was not shortened. One of these papers came from the Royal Infirmary in Glasgow and the other from the Royal Infirmary in Edinburgh. At Glasgow the serum was given to 58 consecutive cases of lobar pneumonia immediately after admission and before they had been typed. These cases were compared with a control series from previous years who, but for serum, had been treated in just the same way; the age incidence in the two groups corresponded very closely. It was again found that the mortality in the serum-treated group was appreciably less in both male and female patients. In both the Edinburgh and Glasgow series there were anaphylactic reactions in several patients despite preliminary tests to detect supersensitiveness.

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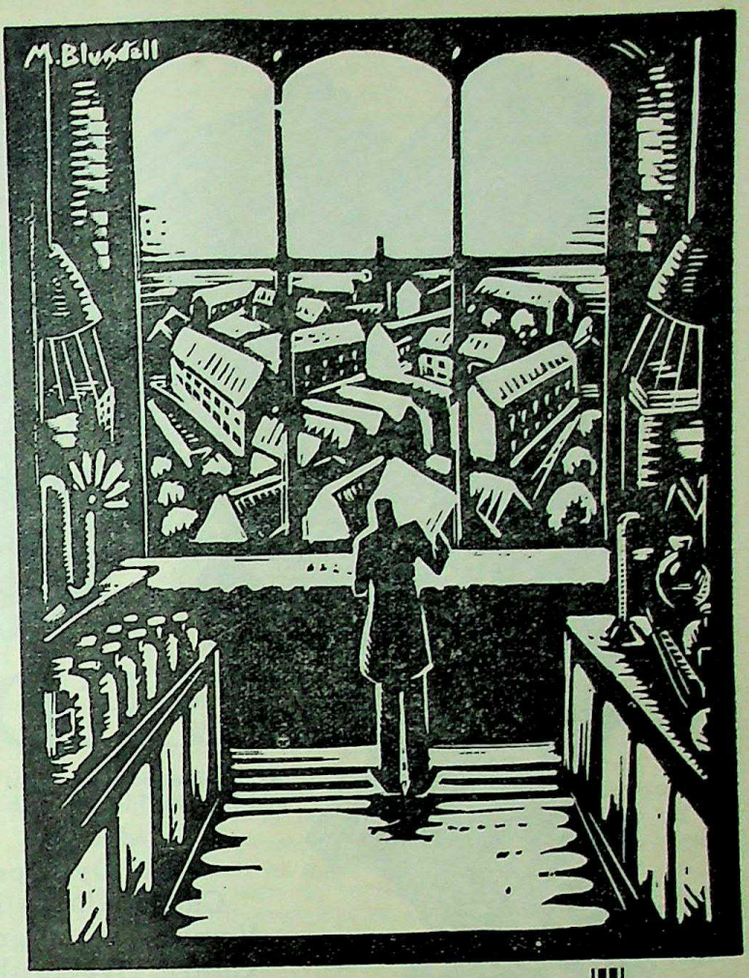

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With the foregoing contributions we have further progress in the search for an adequate serum treatment of pneumonia. Apparently enough evidence has been submitted to indicate that Felton's antibody solution is a remedy decidedly effective in type I and type II pneumococcus pneumonia. It still seems to be more effective in type I, but the more recent contributions appear to establish its value in type II more than even Cecil believed possible two years ago. It is interesting to be able to compare figures from two such widely separated sections of the world.

We believe that the foregoing discussion indicates that there should be no relaxation in the effort to obtain sera which will be even more reliable than any existing to-day.

Bacillus coli Infections.

By K. D. WILKINSON, M.D., F.R.C.P.

(Abstracted from the *Canadian Medical Association Journal*, October 1930, Vol. XXIII, No. 4, p. 499.)

EVERY clinician who works with children must be well acquainted with *Bacillus coli* infections of the urinary tract because the condition is a common one, especially during the earlier years; but as pyelitis can only be diagnosed with certainty by an examination of the urine it is difficult to form any estimate of the exact frequency of such infections. The symptoms are often misleading, so that the urine is not examined, and in less severe cases the diagnosis must be missed many times for each occasion on which it is correctly made.

The typical urine is pale and opalescent, the appearance being unaltered by the addition of acid or alkali; there is at least a trace of albumin present, and under the microscope pus and *B. coli* are seen. But there may be no such gross bacilluria as to produce opalescence, and the quantity of pus may not be great, so that to naked-eye examination the urine appears normal. In such cases a correct diagnosis can only be made by a careful microscopic examination. It is hardly necessary to add that a culture of a fresh specimen of urine is always advisable.

Clinical aspect.

This infection may occur as early as the first week of life; indeed some cases have recently been labelled congenital. It becomes more common at a later date, and only begins to diminish in frequency after about the eighth year.

Symptoms.

Cases may be classified as acute, subacute, or chronic. The acute case often commences with a rigor, or convulsions, and high fever, and general disturbance which may be so severe as to suggest meningitis or pneumonia; the child is obviously ill. Sometimes vomiting or gastro-intestinal disturbance is a marked feature. In slightly less abrupt cases headache, backache, and general illness may suggest a typhoid or some similar infection. These acute symptoms are relatively common in the younger children and make the diagnosis particularly difficult and uncertain until the urine has been examined.

In older children the symptoms of pyelitis tend to be less puzzling, and constitutional disturbance is generally less severe. An abrupt onset is still common, but in the majority of these cases there is some local symptom, such as tenderness in the loin, frequency of micturition, or some discomfort in passing urine to point to the correct diagnosis. Still, many cases are obscure at the onset, and, where vomiting is a feature, the child may present the picture of a profound acidosis when first seen. At times an increased respiration-rate may suggest pneumonia. Malnutrition and anæmia may set in rapidly, and occasionally jaundice complicates the diagnosis. Malaise, rather vague aches and pains, and moderate fever may suggest rheumatism, or abdominal discomfort and tenderness may lead to a mistaken diagnosis of appendicitis or abdominal tuberculosis. Indeed, there is scarcely any mistake which cannot be made in regard to these children.

Many of the chronic cases show surprisingly little constitutional disturbance. The patients are perhaps restless, imperfectly nourished children, who tend to be nervous; but they are brought up for consultation on account of symptoms apparently wholly unconnected with the urinary tract, so that as a rule it is only during the search for the cause of their troubles that the infection is discovered. Fever may be absent or very slight in such children, and apart from the general lassitude and malaise, with anorexia and some pallor, there are no definite symptoms. The subacute cases generally occur among children who show periodic exacerbations of a latent infection, recurrent upsets which may appear with attacks of vomiting simulating cyclical vomiting, or periodic bouts of fever, the cause of which remains obscure until pus and *B. coli* are found in the urine.

Treatment.

The general rule is that patients having acute symptoms do well at all ages under strict treatment, but a certain number of those affected either fail to respond at all or only respond moderately well and gradually fall into the subacute or chronic groups. In the less acute groups the cure is much more difficult, and treatment has to be more prolonged. In some instances the most painstaking treatment seems to be utterly unavailing, and nothing has the slightest effect upon the urine, for the bacilluria persists unchanged in spite of every form of therapy. Some cases show evidence of renal damage, such as the presence of casts in the urinary deposit, a raised blood urea, or a poor urea concentration test. In such cases the prognosis is not at all good, for sooner or later they develop signs of renal inadequacy or cardio-vascular damage.

There seem to be three important requisites in the successful treatment of all cases. Needless to say the earlier the diagnosis is made, and correct treatment commenced, the better the outlook. The first requisite is rest in bed until the condition of the urine is normal. Children generally relapse if allowed to get up and run about before bacilli are completely abolished from the urine. They may relapse after the urine has become normal, but are certainly less likely to do so if kept at rest until the urine is free from bacteria. The second requisite is alkali; this should be given in plentiful doses as sodium bicarbonate or potassium citrate. These drugs are not palatable, and should be made at least tolerable by the addition of syrup and some flavouring agent. The bicarbonate may also be added to drinks, and the citrate given in moderate quantity in home-made lemonade is not objectionable. No degree of alkalinization can completely inhibit the growth of *B. coli* in the urine, since the organism will grow in a more alkaline urine than the kidney can excrete. Wright states that *B. coli* grow in urine of pH 9.0 and the most alkaline urine the kidney can excrete has a pH of 8.6. For some years I have been in the habit of maintaining a constantly varying pH of the urine by alternating alkaline and acid medication. The alkalies are given in as large doses as the child will tolerate until the urine is definitely alkaline; then a mixture containing hexamine and acid sodium phosphate is used until the urine becomes acid, at which point alkalies are again exhibited. This treatment has the advantage not only of discouraging the colon bacillus, but also of diminishing other urinary organisms. I do not place any great faith in hexamine, but prolonged usage has given it some reputation and it seldom does harm. The third point in treatment is the flushing of the kidney by a large fluid intake. Fortunately most of the small patients are eager to drink, and this readiness should be used to give as large a quantity of fluid as possible; even a small child should take fifty to sixty ounces of fluid a day, and more can sometimes be given. Various urinary antiseptics are recommended; hexamine, salol, or hexylresorcinol are those most commonly taken by the

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mouth, while the usual lengthy list of antiseptics may be tried locally. Good results seldom follow such measures. Vaccines occasionally seem to be useful but far more often prove disappointing.

The chronic case and the recurrent case present special difficulties in treatment, and it is still an open question how far one ought to go in attempting to eradicate the infection. 20 per cent. of children with chronic pyuria show some abnormality of the urinary tract. The most common deviations from the normal are dilatation of the ureter or kidney pelvis, and kinking or doubling of the ureter on one or both sides. It is suggested that these abnormalities have a special relationship to urinary infection, such that the abnormality either predisposes the tract to infection, or that a fortuitous infection persists because of the abnormality. In 153 consecutive post-mortem examinations of children in which particular attention was paid to the urinary tract, no less than 13 per cent. of abnormalities were found. Curiously enough the commonest abnormality was ureteral narrowing or obstruction, which occurred in 11 cases. In this series of 20 cases only 4 patients died as a result of urinary tract infection, and as the eldest of these was only 6 weeks old congenital abnormalities can hardly be said to have played a large part in predisposing to urinary infection in this series. On the other hand, there is no definite evidence here for or against the suggestion that abnormalities favour the persistence of acquired infections. In the present state of our knowledge, then, it is essential that every effort should be made to discover any abnormality of the urinary tract in any case of chronic or subacute pyelitis, in order that it may be corrected if possible or the prognosis modified accordingly.

A child with recurring attacks of pyuria who has a double dilated ureter and kidney pelvis can only be regarded as most seriously ill. On the other hand, a single hydronephrosis with a double ureter, provided that the sound kidney is functioning normally, can be treated surgically with reasonably good hope of a definite cure. It is therefore advisable to have a cystogram taken in all chronic cases, and to make a cystoscopic examination in such as are unsatisfactory or doubtful as well as in the definitely abnormal. Pyuria is often associated with bowel infections and occasionally with a chronically inflamed appendix. These conditions should receive appropriate treatment.

Conclusions.

As a clinician I am familiar with a *B. coli* infection of the urine, a condition which is frequent in children, commoner in girls than in boys, appearing in acute, chronic, and recurrent forms, but which is relatively seldom fatal. This condition has been called pyelitis, and although I am not in a position to prove that it is always a pyelitis, I feel that I can prove that it is not always part of a septicæmia or evidence of a nephritis.

It seems that the pathologist has experience only of a selected group of patients out of the many who have *B. coli* infections of the urinary tract—the more severe cases which are septicæmias, and in which the colon bacillus is seldom if ever the primary infecting organism. It is hardly likely that a severe septicæmic condition in children, with renal infection and possibly abscess formation, could have a mortality as low as 3 per cent. after the age of 2, and it is significant that the collection of 78 post-mortem records took no less than twelve years at two large children's hospitals, whereas clinically *B. coli* infections are common.

Nocturnal Incontinence in Children.

By J. PEREIRA GRAY.

(Abstracted from the *British Medical Journal*, 29th November, 1930, p. 906.)

The treatment of nocturnal incontinence in children is eminently unsatisfactory. The distress of mind caused to parent and also to child as soon as it is old enough to realize its disability calls for the publication of any method of relief which has proved successful in several cases.

The time-honoured method of getting the child to empty its bladder on going to bed and of awakening it in an hour or two to pass water, of withholding all drinks after 5 or 6 p.m., and of fixing reels to the child's back to prevent it lying supine, have in my hands proved unsuccessful. I have administered tincture of belladonna up to 30 minims three times a day on the advice of textbooks I have consulted; I have removed tonsils and adenoids and given thyroid; I have tried strychnine and arsenic. With these methods I have had no success whatever.

I have elicited the fact that children who wet the bed at night have also very irritable bladders by day. At home they are constantly running to the lavatory; at school they are constantly asking permission to leave the room. The obvious prophylaxis, then, is to bring the bladder under control. I have therefore insisted on parents training their children to empty their bladders at fixed hours. The child is not permitted, at first, to pass water for two hours, then for three hours, then for four, and so on. When the child can hold its water for four or five hours, the nocturnal incontinence disappears. The bladder becomes trained, just as the rectum can be trained to function properly.

Reviews.

THE MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX.—Edited by C. F. Coombs, M.D., F.R.C.P., and A. R. SHORT, M.D., B.S., B.Sc., F.R.C.S. Forty-ninth year, 1931. Bristol: John Wright and Sons, Ltd. Pp. xcix plus 604. Illustrated. Price, 20s. net. Postage, 9d.

It is very difficult to find anything new to say about the *Medical Annual;* most of the epithets we would like to use have become hackneyed by constant use in past years. One can only repeat that "it has maintained its own extremely high standard." The editors claim that it is a review of the year's work in the treatment of disease; it is more than this; it is a concise record of all the advances made in medical science throughout the world during the year.

It has not been a year of any outstanding discoveries, but in all branches of medical science there have been steady advances to record.

An increase in the incidence of a type of undulant fever caused by the *Brucella abortus* has been noted in England. Infection by the allied organism, *Brucella melitensis,* is not uncommon in certain parts of India; it seems possible that infection by the former organism may account for some of the undiagnosed fevers so common here.

The new "hydration treatment" of epilepsy may prove to be an advance of some importance. Details of this treatment are given; it consists of a gradual cutting down of the patient's fluid intake. A certain amount of modification of this routine would have to be made to suit the different climatic conditions encountered in India. For the treatment of arterial hypertension a new drug, acetylcholine, is introduced; this is given by the intramuscular route, it acts very rapidly, and the effect lasts for several hours. For the production of a long-continued effect, watermelon seeds are advocated; these are taken by the mouth in capsules every twenty-four hours. More work has been done on the use of iodine compounds for the production of *x*-ray shadows. Doubt has been expressed as to the effect of such large quantities of iodine on the tissues, but it has been established that lipiodol, at least, has a definite beneficial effect on the bronchial mucous membrane.

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Extract from the Medical Journal of Australia, October 4, 1930. (The Official Journal of the B. M. A. in Australia.)

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It has for some time been established that lack of hydrochloric acid in the gastric juice is associated with pernicious anæmia; recent work has shown that a correlation exists between this deficiency and certain other diseases, asthma in children for example. This observation may prove to be of importance in this country where achlorhydria is much more common than it is in Europe.

Further advances in the use of spinal anæsthesia are recorded; by the use of Percain or Novocaine the whole body can be safely anæsthetized. A detailed description of Schmieden's ingenious operation for inguinal hernia is given. He withdraws the testis and cord completely from the scrotum, and loops it through a slit in the internal oblique and transversalis muscles; he then replaces the testis in the scrotum, and sews up the canal completely. Three coloured illustrations make the details of the operation easy to follow. A case of poisoning after the introduction of B. I. P. P. in the treatment of chronic osteomyelitis of the femur is described and illustrated; the advantages and the dangers of this method are well exemplified in this case. There is a short discussion on the various tests for pregnancy. It is quite obvious that the Zondek-Aschheim test has gone far beyond all others in giving accurate results. Furthermore, there are few technical difficulties to stand in the way of its extensive use. Accurate results are obtained in 95 to 98 per cent. of cases. The test is dependent on the presence in the urine of a pregnant woman of large amounts of a sex hormone which is normally only present in the anterior lobe of the pituitary. The existence of the hormone is demonstrated by the production in the ovaries of virgin female mice of "blood points," due to the growth-stimulating properties of this internal secretion.

The tropical diseases are, as usual, well done, but we are not quite sure whether justice has been done to Plasmochin. The dangers of the large doses have been somewhat overstressed, and it has not been made clear that very much smaller, safe doses are equally efficacious.

For the practitioner who has not got access to a large library this book is an absolute necessity, and we should advise him to scrape together his last rupee in order to purchase it.

L. E. N.

MODERN SURGERY. (GENERAL AND OPERATIVE.)—By J. C. da Costa, M.D., F.A.C.S. Tenth Edition. Philadelphia and London: W. B. Saunders Company, 1931. Pp. 1404, with 1,050 illustrations, some in colours. Price, 45s. net.

This is the tenth edition of this book and it is a volume consisting of 1356 pages of closely printed reading matter.

In their preface the authors state that in this edition the sections have all been re-written by themselves with one exception, *i.e.*, the section on bronchoscopy and œsophagoscopy, which was written originally by that eminent master Dr. Chevalier Jackson and remains as when it was written; it is just as much a masterpiece now as it was then. No attempt is made to dilate on radiation therapy throughout the book; the reason for this, as explained in the preface, is that the subject has now become so vast and technical that it is out of place to include more than a passing reference to its application in a textbook on surgery. It is not quite clear whether the authors intended the book to be a reference book, or a textbook for students; if the former, it definitely has its place in the literature of surgery; if the latter, we are frankly of the opinion that it will not serve its purpose. It is in one volume, is immensely heavy, and there are no chapters.

Sections follow one another with merely one line intervals, and the whole text is studded with references, interspersed throughout the sentences, the average number being 16 to a page. This, whilst demonstrating a profound knowledge of contemporary literature, makes the reading of the book none too easy. In addition the phraseology is definitely American; all infinitives are split, and many words which certainly cannot be found in the English dictionary may be detected in the text. The work of looking through the proof sheets of a book of this size is certainly a huge undertaking, and a certain number of printer's errors can be glossed over, but at the same time there are too many spelling mistakes which cannot be accounted for by "American spelling."

Let us now deal with its brighter side for there is a lot of solid good material in the book.

The earlier sections are devoted to bacteriology, inflammation, etc., as is the custom with most surgical volumes, and a good account is given of all these conditions. Later sections deal with various conditions, some, as is natural, being better than others. Especially good is the section dealing with the general aspect of surgical tuberculosis, which is described with a wealth of detail and intimate knowledge.

In the section dealing with injuries the authors state that they suture all lacerations of muscles, nerves and tendons with iron-dyed silk, and that they have never seen a sinus or other complication result. The section on cranial surgery is also well written, and Chevalier Jackson's section has already been alluded to. The section dealing with tumours, except tumours of bone, is frankly disappointing, there being little attempt to subdivide and the pathology being scanty.

The authors' observations regarding the injection treatment of varicose veins and hæmorrhoids are interesting in that they state that they are in favour of operation instead of injection as the latter, no matter how carefully done, almost always fails to result in permanent cure, whereas operation does effect a cure. This statement, at any rate as regards hæmorrhoids, has recently been supported by Lockhart-Mummery.

The surgery of the autonomic nervous system and its physiology are excellently described, and this section is especially deserving of careful study.

In reading through the abdominal section we were somewhat surprised to note that cholecystostomy and not cholecystectomy is recommended in all cases as the operation of choice when operating on a gall bladder containing gall stones. This is certainly not in accordance with the modern procedure carried out by the majority of British surgeons.

Time and space do not permit of any further detailed description of the rest of the book. As a volume of reference it will no doubt be a useful addition to the library of a practitioner who may require such a book, but in its present form we do not consider it will be acceptable to students.

H. E. M.

A TREATISE ON ORTHOPÆDIC SURGERY.—By Royal Whitman, M.D., M.R.C.S., F.A.C.S. Ninth Edition. London: Henry Kimpton, 1930. Illustrated with 981 engravings. Pp. xii plus 1085. Price, 45s. net.

Whitman's *Orthopædic Surgery* is now of twenty years standing and has established itself as a well-tried and favourite textbook. One of its characteristic features is the detailed and profusely-illustrated section on treatment for each condition, which is of the greatest possible value to surgeons working by themselves, with no opportunity of seeing the work of experts. New editions appear every two or three years, and new matter is incorporated without a corresponding pruning of the old, with the result that the book is steadily increasing in size. An instance is the description of the Abbott treatment of scoliosis, which occupies 13 pages and has 13 illustrations, ending with its unqualified condemnation and the statement that the method has been given up at the author's own hospital, as indeed it has at most others. Surely then the time has come to eliminate it from a chapter already long by reason of the detailed figures of physical exercises it contains,

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matter of the greatest value to isolated practitioners who may have to supervise such exercises themselves.

Unfortunately, the preface does not inform us which sections have undergone change, so that a very laborious comparison of the present with the previous edition is required of the reviewer. One naturally looks first for the latest American views on the operative treatment of spinal tuberculosis. Hibbs, who advocates operation in practically all cases, reports 74.6 per cent. of cures in 286 cases; there were 67 deaths in this series, 10 of which were from other causes. Albee claims to have arrested the disease in 84.4 per cent. of cases, with a 3 per cent. mortality, but on the other hand Henderson in 264 cases, all but 10 per cent. of which were grafting operations, reports only 66 per cent. of good and fair results. The conclusion reached that these operations merely ensure more efficient splinting and are to be looked on as supplementary to conservative treatment and not as in themselves curative, will be accepted by all surgeons.

There are some new notes on Hibbs' fusion operation for spondylolisthesis, and a useful short section on back pain has been re-written. The Orr treatment of osteomyelitis, and descriptions of new operations for recurrent dislocation of the shoulder, for acromio-clavicular displacement and for abductor paralysis in anterior poliomyelitis, which are still on their trial, are given.

It is surprising to find that the chapter on rickets contains no reference to modern work on the ætiology of this condition and that in consequence the sections on treatment are very inadequate. The treatment of congenital dislocation of the hip has been entirely re-written and we find, as was evident from the discussion at the British Medical Association meeting at Winnipeg, that Lorenz's method is losing ground and that forms of operative treatment less severe than the old open operation are coming more and more into use. The chapters on poliomyelitis, though almost unaltered, are amongst the best in the book and special mention must be made of the useful chapters on shoes and on weak feet and their treatment. Readers will appreciate Whitman's own original description of his abduction treatment of fractures of the neck of the femur and of his reconstruction operation, the two procedures for which he is best known in the orthopædic world. It will be seen that the book well maintains its old reputation, though one would like to see it subjected to a drastic overhaul, with excision of some of the old matter. It is profusely illustrated, but it would be an improvement if the reproductions of *x*-ray photographs were printed on glazed paper. In spite of these few faults, this book can be cordially recommended to all who require a sound practical guide in this difficult branch of surgery.

W. L. H.

CRIPPLED CHILDREN: THEIR TREATMENT AND ORTHOPÆDIC NURSING.—By Earl D. McBride, B.S., M.D., F.A.C.S. St. Louis: The C. V. Mosby Company, 1931. Pp. 280, with 159 illustrations. Price, $3.50.

This is a small book of 262 pages written chiefly for the benefit of nurses, mothers, and others who undertake the duty of looking after the crippled child.

The author explains how the mother or the child's nurse should examine the child if it is thought that there is some deformity present, the best posture in which to place the child before the surgeon is called in, and the meaning of many of the common medical and surgical terms.

For the benefit of students and hospital nurses, Dr. McBride describes and supplies photographs of many of the splints and instruments used in orthopædic surgery, and explains their uses, also the method of preparing plaster of Paris bandages, the actual plaster solution, and all appliances necessary to be got ready for the surgeon when he is about to apply a plaster cast.

The very necessary care of the plaster cast, the post-operative treatment, and the all-important subject of massage are well described.

The proper method of applying a tourniquet is also explained. This little book should prove of real use to the orthopædic nurse, both during and after her training, and it could also be read with advantage by students, in conjunction with textbooks on orthopædics, when preparing for their final examinations.

It is well printed on good paper and contains numerous excellent photographs and diagrams.

H. E. M.

AIDS TO MEDICAL TREATMENT.—By J. T. Lewis and T. H. Crozier. London: Baillière, Tindall and Cox, 1931. Pp. vii plus 244. Price, 3s. 6d. net.

This little book is a satisfactory addition to the now extensive "Aids" series and the information given on medical treatment is concise and up to date. Many workers in infectious diseases hospitals will be disposed to contest the authors' remarks on the value of Pyramidon in measles nor is there unanimous enthusiasm among workers in the tropics for quinine by the intramuscular route. The book concludes with a useful chapter on medical nursing, a branch of the healing art too often neglected by the medical man. A few errors, *e.g.*, "beral," for "liberal" (p. 7), "Naguchi" (p. 26) and "produced" for "reduced" (p. 22) will doubtless be corrected in future editions.

J. M. H.

THE ALCOHOL HABIT AND ITS TREATMENT.—By Walter E. Masters, M.D., M.R.C.S., D.P.H. London: Messrs. H. K. Lewis & Co., Ltd., 1931. Pp. 190. Price, 6s. net.

Alcohol poisoning, save in its more acute manifestations, is apt to receive but scant attention from the practitioner who is disinclined to regard overindulgence as a disease worthy of his attention. Nevertheless, as the author points out, it is a disease, and a lamentably common one, calling for the most careful and tactful handling.

This book, therefore, discussing all degrees of alcoholism from the point of view of the physician, the predisposing causes, the ultimate effects, and the treatment, is an important contribution and is the more convincing in that it is free from faddism.

In the early chapters the pharmacology of alcohol is discussed and it is pointed out that, apart from its food value and carminative action, the effect is mainly depressant, decreasing the precision of muscular movements and depressing the higher brain functions. The author however admits its value at the end of the day's work. The reader confronted with these pharmacological facts may find them difficult to reconcile with his clinical observations as to the undoubted value of alcohol in certain conditions when administered at appropriate moments, to the tired man, to the exhausted patient, to the sick child. Probably the value lies mainly in its easy absorption as a food and sugar-sparer, undoubtedly the carminative action is important, and possibly to the tired brain-worker the narcotic action, strictly limited, is beneficial. In these days of stress and worry it is good at times to "relax the bow."

The various types of alcoholism are described under Hare's classification. The differences between true and pseudo-dipsomania are detailed, and it is pointed out that true dipsomania is a form of periodic insanity, that mental changes appear before alcohol is taken, and that—under appropriate treatment—the attack may in many cases be warded off. In this connection it is interesting to note that the author considers that alcoholism is less a cause of insanity than a result, the weak-minded being particularly prone to the disease.

On the subject of treatment the author emphasises the necessity for residence in an institution with skilled nursing and control. He gives in detail the lines of treatment adopted, and stresses the importance of

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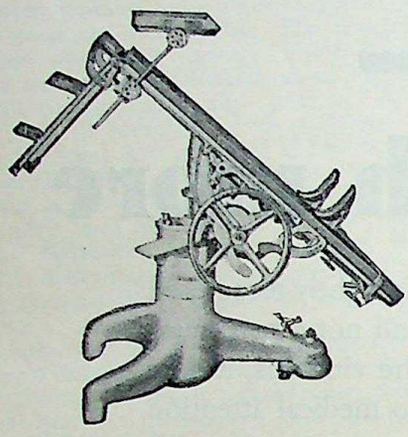

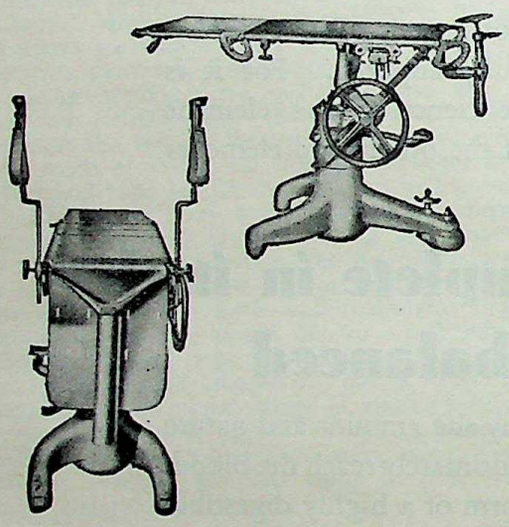

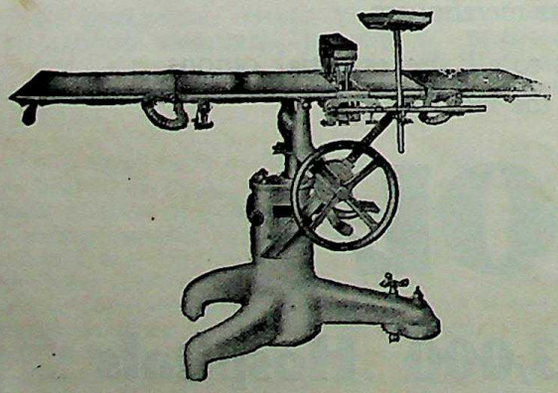

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psycho-therapy as an adjunct to drug treatment and the benefit of communal influence in a "home." He lays down among other essentials for successful treatment two special points, firstly, the whole-hearted desire of the patient to be cured and, secondly, a total and permanent abstinence after treatment.

The book is one which may be recommended to all practitioners without reserve.

E. H. V. H.

RECENT ADVANCES IN RADIOLOGY.—By Peter Kerley, M.B., B.Ch., D.M.R.E. London: J. & A. Churchill, 1931. Pp. viii plus 324, with 120 illustrations. Price, 12s. 6d.

In this little book of 309 pages the author writes "it is obviously impossible to deal at length with all the advances in radiology, hence those in technique and physics which convey little or nothing to the general medical man are largely omitted." His object has been to correlate pathological and radiological appearances in such a way as to simplify the interpretation of radiographs for those not practising radiology. Nevertheless, the text will be read with interest by the specialist in radiology. The book would appear to be more than a summary of recent advances, because the author in most cases gives an account of the older work on *x*-ray diagnosis.

The chapter on the lungs is particularly interesting because it gives an account of the recent work of Assman, Wessler and Jacques, Graeffe, and Kupferle, Burrell and Melville—a description which has fundamentally altered our ideas of the origin of tuberculosis in the lungs. The book is richly illustrated with copies of radiographs and black and white sketches. There is an extensive bibliography at the end of each chapter. Finally, there is a short chapter on *x*-ray therapy setting forth the latest technique in the treatment of malignant disease and including a description of the modern methods of measuring dosage. It is a volume which no general practitioner nor radiologist can afford to omit from his book-shelf.

J. A. S.

ROENTGEN INTERPRETATION. A MANUAL FOR STUDENTS AND PRACTITIONERS.—By George W. Holmes, M.D., and Howard E. Ruggles, M.D. Fourth Edition. Thoroughly Revised. London: Henry Kimpton, 1931. Pp. xii plus 339, illustrated with 237 engravings. Price, 21s. net.

This well-known work on *x*-ray diagnosis needs little introduction. It was one of the first works to deal with the subject from the point of view of interpretation and is admittedly a standard work. It has self-imposed limitations; *e.g.*, in the preface we read "It is our purpose, as in the past, to present a brief survey of the field of Roentgen-ray diagnosis. Such a survey can do little more than cover the essentials of the subject."

The early chapters dealing with fractures, dislocations and bone pathology are fairly comprehensive and cover a wide range of conditions. The description in the text is usually brief and to the point. The reproductions of skiagrams, however, cannot be said to be anything like first class. Generally speaking the detail is poor and not up to the standard of other well-known works; *e.g.*, the picture of a subperiosteal fracture of the tibia in figure 20 leaves everything to the imagination, and might have been omitted. Similar criticism applies to most of the skiagrams reproduced in other parts of the work. There are a few excellent reproductions, but the majority leave too much to the imagination.

The skull is dealt with in chapter 5 and there are some reproductions of ventriculograms. The sinuses, however, receive rather meagre attention, and there is no skiagram showing the sphenoidal sinuses in the special positions mentioned in the text.

There are some good pictures of the spine, and joints, tendons and bursae receive adequate attention.

As regards the chest, the heart and great vessels are well done, but in dealing with tuberculosis of the lungs the authors do not mention any of the recent work found in the writings of Assman, Wessler and Jacques, Graeffe, Kupferle, Burrell, Melville and others. The non-tuberculous conditions of the lungs are better dealt with.

The *x*-ray examination of the gastro-intestinal tract is discussed on sound lines and there are some useful tracings.

Finally, there is an excellent outline of the examination of the genito-urinary tract, except that Uroselectan which is becoming increasingly important in this field is scantly dealt with, also there is only a very meagre description of the examination of the female genitals with Lipiodol, and of the uses of *x*-rays in the diagnosis of pregnancy and its complications.

The book on the whole is disappointing although it is useful as setting forth some of the American points of view.

J. A. S.

ANATOMY IN THE LIVING MODEL.—By Professor David Waterston, M.A., M.D., F.R.C.S.E., F.R.S.E. London: Messrs. Hodder and Stoughton, Ltd., 1931. Pp. 255, with 16 plates in colour and 74 figures, many in colour. Price, 25s. net.

The book consists of 5 parts dealing with (1) the skin-covered surface of the body, (2 and 3) upper and lower limbs, (4) head and neck and (5) thorax and abdomen. The student while learning anatomical details by dissection is apt to forget that his knowledge thus earned is to be applied to the living subject when he studies medicine and surgery. The author in this book has guided the student in identifying all the parts in the living subject as far as practicable including bones, muscles and tendons, vessels, nerves and viscera. The chapter on the "skin-covered surface of the body" contains the subdivision of the skin into "arterial areas" in addition to nerve areas on a segmental plan and is very interesting. The movements of the joints have been very carefully dealt with. There are 16 plates in colour and 74 figures which are very instructive. The new nomenclature has been chiefly adopted though the old one has not been scrupulously avoided. The appendix contains useful practical exercises for the demonstration of the functions of nerves. The book is not meant to replace textbooks of anatomy which deal with anatomical details, but its study will supplement the training in anatomy with a view to its application to medicine and surgery. The get up of the book is excellent.

N. P.

THE SEXUAL LIFE OF MAN.—By Dr. Placzek. Second Edition. Translated from the German by L. S. Morgan, M.R.C.S., L.R.C.P. London: John Bale, Sons & Danielsson, Ltd., 1931. Pp. 314. Price, 12s. 6d. net.

The book claims to be a review of the existing scientific knowledge about the sexual life of the human species. The author has attempted to cover the whole field of man's sexual life, anatomically, physiologically and psychologically. Even the forensic aspect of the problem from the German standpoint receives its measure of attention. It is a pity that the author displays so marked and, be it said, unreasonable an attitude of prejudice against the findings of psycho-analysis. It seems that he has relied almost entirely on the work of Sadger for information on psycho-analytical researches into the ætiology of the sexual impulse as well as the libido theory in general. He confounds the very divergent teachings of Freud and Jung, and even goes so far as to spell the name of the latter with a diæresis! In respect of the sexual life of children, the author's views are not only vague but strangely at variance with those held by accredited authorities on the subject. As might be expected, the psycho-analysts have a rough time of it here. It is noteworthy that the author makes no reference to the International League for Sexual Reform, in spite of the fact that German sexologists took a leading part in the

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proceedings of its last congress held in September 1930. The book is provided with a fairly good bibliography, but as the book is meant mainly for Germans the references to works by non-German authors, with one or two exceptions, are only to their translations into that language.

O. A. R. B.-H.

ROSENTHALER'S CHEMICAL INVESTIGATION OF PLANTS.—By Sudhamoy Ghosh, D.Sc., F.R.S.E. Authorised translation of the third, improved and enlarged German edition. London: G. Bell & Sons, Ltd., 1930. Pp. 197. Illustrated. Price, 12s. 6d. net.

AN increasingly large and healthy interest is now being taken by chemists and research workers in the various universities and academical institutions in the isolation and investigation of the active principles of medicinal plants. Unfortunately there are no suitable and authoritative books in the English language which can serve as a guide to workers in this field. The beginner is now compelled to spend—perhaps fruitlessly—a good deal of his valuable time in groping through a large mass of highly technical literature in order to find out a way for himself. To add to this, most of the journals dealing with the subject are in languages other than English and, to do justice to the literature, a thorough acquaintance with foreign tongues becomes essential. How embarrassing the position of the beginner becomes can, therefore, be easily estimated and it is no wonder that most people are scared away from rather than attracted to this field of research and investigation. Dr. Ghosh's translation is designed to fill this gap as far as the English-speaking worker is concerned, and it may be unreservedly said that he has eminently succeeded in his attempt.

The chapters are full of useful information and judged from the point of view of clearness and lucidity of exposition they are above reproach. A little more elaboration of the subject-matter, especially in those portions of the book dealing with methods of quantitative estimations, would certainly have been better, but this does not detract from the usefulness of the book in any way. The printing and format are excellent, and we are sure that, as a guide book for research in the domain of plant chemistry, it will prove of the highest service.

R. N. C.

EGYPT: THE HOME OF THE OCCULT SCIENCES.—By T. Gerald Garry, M.D., M.Ch., M.A.O., M.B.E. London: John Bale, Sons & Danielsson, Ltd., 1931. Pp. 93. Price, 7s. 6d. net.

THE title of this book would lead one to believe that some information would be given about that great character Imhotep, as well as facts about Egyptian medical history. Unfortunately this hope was not realised, as the book is only a bad compilation of the little that is known of the subject. The author is a physician practising in Cairo, and one hoped that he would have been able to obtain a great deal of information about these matters from local sources. The book is full of inaccuracies; thus the explanation given of the magic signs, the Ded column symbolic of Osiris, the *ankh*, the symbol of life, and the Nefer are wrongly explained. The four interesting medical papyri, *i.e.*, the Ebers, the Hearst, the Edwin Smith and the Berlin, are dealt with in a couple of pages. The translation of these papyri has been done by non-medical men, and one would have thought that as the author is on the spot and has some knowledge of the occult and of the local indigenous system of medicine he would have been able to arrive at the translation of a few of the ingredients in the prescriptions. In the Ebers papyrus a small section is devoted to a disease of the aorta which the author has wrongly translated as aneurysm. In the North-West Frontier and the Punjab there is a popular belief that the aorta becomes dislocated from its bed and the disease is called *Nar* or *Dharan*, which must be the lesion alluded to in the Ebers papyrus. This condition is seen amongst debilitated people when the pulsation of the aorta is not only felt, but is visible. Little or no attempt is made to follow the steps in the traditional history of that great character Imhotep, a vizier of the 3rd dynasty, *circa* B.C. 3200, who apparently was the first chief priest, as well as an architect and the most powerful intellectual man of his day. His name and fame were gradually transformed in the course of centuries, so that he became a titular deity in the Egyptian hierarchy. The author had a good opportunity to write a really interesting monograph, but unfortunately he failed to do so.

H. W. A.

PRACTICAL ANÆSTHETICS.—By C. F. Hadfield, M.B.E., M.A., M.D. (Cantab.). Second Edition. London: Baillière, Tindall and Cox, 1931. Pp. xiv plus 336, with 41 figures in the text. Price, 7s. 6d. net.

THE second edition of this book is a great improvement on the first. Almost a third of the book is certainly new. Several chapters have been rewritten. A very useful chapter on spinal and splanchnic analgesia has been added. The use of Percain for spinal anæsthesia is a new method and it is bound to find favour with most surgeons. The chapter on local analgesia in dental practice will be helpful to students qualifying as dentists. Those specialising in anæsthesia would do well to go through the book carefully. It is a practical book on anæsthesia useful both for students and practitioners.

S. N. M.

Annual Reports.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1928. VOL. I. WITH APPENDICES. CALCUTTA: GOVERNMENT OF INDIA. CENTRAL PUBLICATION BRANCH. 1931. PRICE, Rs. 3-6.

THIS is a very readable and highly interesting report. In his introductory chapter, General Graham outlines the present system of public health administration in India. He points out how the physical advancement and health of nations depend on the social evolution of the people and are attained only by foresight, advancement and expenditure. He quotes Sir George Newman's basic principle as to what a modern state must work to:—

(*a*) Ascertainment and accurate registration of the data obtainable.

(*b*) The establishing of a definite standard to work to, which should be based on health and physiology and not on disease and pestilence.

(*c*) The study of the character and incidence of disease, its causes and predisposing conditions, its mode of spread, the social factors which increase or reduce it, and the means of its treatment and prevention.

(*d*) The establishment of a national organisation by the assent of public opinion, such organisation being an index of the aspiration and enlightenment of the people.

Vital statistics.—The crude birth rate, death rate, and infantile mortality rate for 1928 were 36.78, 25.59, and 173. The natural increase of 11 per 1,000 is twice that of England, equal to that of New Zealand and Australia and less than that of Egypt.

Birth rate.—This was 36.78 per 1,000, an increase over that of 1927 which was 35.27. Practically all provinces recorded increased birth rates. 108 males are born to every 100 females in India. In the North-West Frontier Province the proportion is 131 to 100.

Death rate.—This was 25.59 per 1,000, against 24.89 in 1927. The lowest recorded death rate was in the North-West Frontier Province (1931) and the highest 33.66 per 1,000 (that of the Central Provinces). Some

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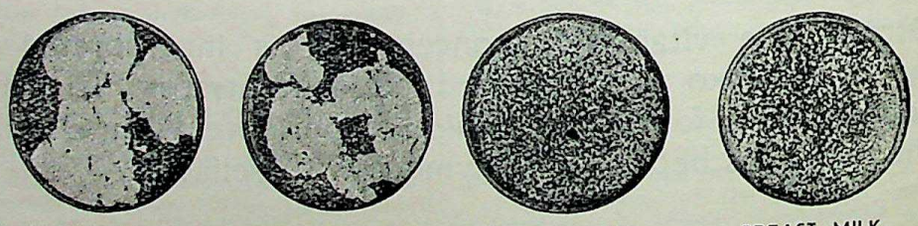

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of the urban death rates are very high, Coorg for instance records a death rate of 55.88 in towns, and Poona 40.08.

Infantile mortality rate.—One-fourth (25 per cent.) of the total mortality of India occurred in the first year of life. The infantile mortality rate per 1,000 live births in 1928 was 173. A very interesting diagram of the infantile mortality rates for England and Wales, and for India is given, comparing the rates under 1 month, from 1 to 6 months, and from 7 to 12 months. The comparisons are very striking. In England 31 per cent. of the infant deaths occur in the first month, in India 84 per cent.

The rates vary in the different provinces and towns. Poona (suburban) returns the extraordinary rate of 968, and Poona town 553. Every town gives a rate of over 200 and many are over 300. The rates in Burma towns are particularly high. The checking of the registration of vital statistics is an important function of health departments; such checking as is done shows that errors of omission up to 15 per cent. may occur. The influence of such errors on the vital statistics of India is obvious. Many of the Indian states for instance show remarkably low death rates—between 9 and 11. There is no reason to believe that such low death rates occur anywhere in India; they are due to deficient registration of statistics.

History of chief diseases.—As we pointed out last year the table of "Notifiable" diseases on page 29 is misleading. The diseases mentioned are not notifiable by law when they occur in all the provinces stated but are headings in the form of registration. In Bengal Presidency for instance, no diseases are notifiable by law outside Calcutta. This should be made clear. In British India, "fevers" headed the list in 1928 with a mortality of 14.2 per 1,000, "all other causes" was next with 6.53; respiratory diseases—1.60, cholera—1.45, plague—0.50, small-pox—0.40 coming in order after these.

Fever is a heterogeneous group and in two provinces attempts were made to subdivide it into components.

Malaria.—Over 8,000,000 cases were treated at hospitals and dispensaries, Bengal and the Punjab showing the highest figures, though the latter province is reported as being "free from epidemic malaria." Antimalarial campaigns were conducted in the United Provinces in the Terai and Bhabar government estate, and in the Sarda canal works. In rural areas experimental schemes were in operation. Post-graduate instruction was given to medical officers of health and others. In Madras special grants were made to South Arcot. In Bengal the most notable achievement was the demonstration of the *fuliginosus* group of anopheles as carriers of malaria, *A. philippinensis* showing the highest percentage (2 per cent.). Antimalarial societies are a feature of this province. In New Delhi very complete measures have been taken to tackle mosquito breeding in general.

As regards quinine, bark is obtained from government plantations in Bengal and Burma, and from Java, which is worked at Mungpoo and Naduvattam. 32,134 lbs. of quinine sulphate were made in 1928. Bengal consumes the largest amount of factory products. Madras granted Rs. 95,000 for the free distribution of quinine and is reported to have had successful results.

Relapsing fever.—Bengal reports the largest mortality from this disease, which seems rather extraordinary as it is not a common disease in the plains of Bengal. The figures for the year report an increase of 36.5 per cent. over the previous year.

Kala-azar.—Mortality is reported from the United Provinces, Assam, Bengal, Madras, and Bihar and Orissa. The deaths in Assam were only 1,660 as against 2,859 in 1927. There is no doubt that the epidemic in Assam is on the wane and its "waning" has been definitely encouraged by the excellent system of treatment centres adopted by the Assam Government. Bihar and Orissa showed by far the highest mortality, no less than 41,886 deaths being recorded. In Bengal the deaths were fewer than in 1927 and in this province also the disease is slowly dying down.

Enteric fever.—This is a serious cause of mortality in India and many of the "fever" deaths are due to it. Bengal and the United Provinces in 1928 showed by far the highest death rates from enteric. Calcutta recorded 866 deaths.

Typhus.—Lice-borne typhus was recorded in the Dera Ghazi district of the Punjab.

Respiratory diseases.—These exact a heavy annual toll of deaths in practically every province of India, being second only to "fevers." A useful diagram on page 48 shows the incidence in each province. Delhi province easily heads the list for 1928, Bombay coming next. Generally speaking the wet provinces seem freer of respiratory diseases than the dry ones.

Pneumonia.—High death rates are reported from most of the towns of the United Provinces, though Coorg heads the list with a death rate of 20.81 in its urban areas.

Tuberculosis.—A useful list of sanatoria and tuberculosis hospitals in the various provinces is given. The highest death rates from tuberculosis are furnished by the towns of the United Provinces. Cawnpore returns a rate of 5.05 per 1,000; the rates from Bombay towns are also high.

Cholera.—A feature of the report is the excellent series of maps and graphs showing (*a*) the distribution of cholera during the year 1928, (*b*) 58 years of cholera mortality in British India (1871—1928), by provinces and as a whole (an excellent presentation showing the years of greatest incidence and the relationship of the *Kumbh melas* of Hardwar and Allahabad to epidemic outbreaks in India), (*c*) cholera by months in the various provinces during the last 10 years (this shows very well the puzzling differences in the seasonal distribution of cholera in the various provinces), and (*d*) the average distribution of cholera in the provinces during the last 10 years.

In 1928 two important papers, one by Sir Leonard Rogers, and one by Lieutenant-Colonel Russell and Mr. Sundara Ranjan, were published on the epidemiology of cholera with particular reference to rainfall and humidity. These papers are well known now to all workers in this field.

1928 showed a fairly high death rate from cholera in India; this was 1.45 per 1,000 compared with 1.26 in 1927. The Punjab remained free despite the large fair held at Thaneswar attended by 7,000,000 people. No serious outbreak of cholera occurred as the result of this fair.

The chief anticholera measure adopted in Bengal was anticholera inoculation; over 2,000,000 cubic centimetres of vaccine were manufactured and nearly 2,000,000 inoculations performed. In the Punjab particular attention was given to the improvement and protection of water supplies, especially in connection with the eclipse fair at Thaneswar. The results were very satisfactory. 60,880 inoculations were done in the United Provinces, 113,826 in Assam, 111,532 in the Central Provinces, 186,435 in Burma, and 650,000 in Madras. These are encouraging figures and cholera is now more and more receiving the attention it deserves all over India.

Plague.—1928 was rather a bad year for plague, the mortality being 3 times that of 1927; 121,242 deaths were recorded, a rate of 0.5 per 1,000 for the whole of India. The United Provinces were most affected, with 5 times the rate of 1927; Bombay was next, with a death rate of 3½ times that of 1927. Aden had a sharp epidemic; the cause of the introduction of plague into that port was never clearly established. Measures for prevention were put in the hands of a specially appointed "Plague Authority." The epidemic started in January and lasted till June. There was a heavy rat mortality from plague, the infected-rat rate rising rapidly from 1 rat to 300 per 1,000.

The United Provinces since 1922 have continued to be the chief home of Indian plague, though the Punjab in 1924 and 1926 had severe epidemics. Bengal and Assam

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continue to be completely free. Very interesting research work was carried out on plague in the Haffkine Institute and elsewhere, on the rat and its fleas, and on the geographical distribution of rat fleas.

Antiplague measures.—In the Punjab extensive rat destruction was carried out in "carrying-over" villages. Calcium cyanide was found effective. In Delhi city trapping is the method selected. 164,488 rats were destroyed at a cost of -|1|5 annas per head of population. *X. astia* was the predominant flea there. In the United Provinces research showed that rat fleas generally die within a week of separation from rats and much earlier in the hot weather. There is no evidence that there is a chronic form of plague infection amongst rats.

Small-pox.—1928 was a favourable year. A diagram on page 73 gives a very good picture of the seasonal distribution, which is the same throughout India, being at its highest in the hot dry months. The type of small-pox in India is severe. The Vaccination Act of 1880 is a voluntary Act and may be enforced by local governments where they think fit. Voluntary vaccination reached its highest point in India in 1922 since when it has been declining. The disease was severe in Delhi, Assam, and Coorg. Malda (Bengal) returned the highest rural death rate, 3.4 per 1,000. The highest town rate was 13.3 in Malayalam in Bombay.

In Assam regulations under the Epidemic Diseases Act proved valuable. The number of small-pox cases treated in isolation hospitals is absurdly small all over India. In the whole of Assam only 48 were so treated, although 8,461 deaths were recorded. Small-pox is essentially a disease in which institutional isolation and treatment help to stop infection.

Dysentery and diarrhœa.—This accounts for nearly 1 per mille of the deaths in the whole of India. The Central Provinces showed the very high figure of 2 per mille, and the North-West Frontier Province had the lowest figure.

Venereal disease.—Some headway has been made in this difficult subject. Army returns show that these diseases are widely disseminated. Bombay and Madras provinces have each appointed a specialist officer to advise them on policy and to initiate schemes of treatment and prevention. The facts requiring remedy are the paucity of up-to-date centres for treatment and diagnosis and the consequent defective training and knowledge of our medical men as a whole.

Beri-beri.—This was comparatively absent during the year as a cause of mortality.

Ankylostomiasis.—The report gives prominence to the statement of Dr. Chandler that India as a whole does not suffer much from hookworm *disease* though the amount of *infestation* may be high in places. In Madras the hookworm campaign initiated by the Rockefeller Foundation has been taken over by the Madras Government.

Leprosy.—The policy of the British Empire Leprosy Relief Association in encouraging and assisting the training of medical men in every province of India in the diagnosis and treatment of leprosy was pursued successfully in 1928. Surveys are being carried out in various provinces and districts, and knowledge of the disease, especially of the early and amenable stages, is being widely spread.

Rabies.—2,193 deaths from rabies were reported in 1928. Madras and Bengal have the highest incidence, the Punjab and the North-West Frontier Province and Assam returning low figures.

Maternity and child welfare.—General Graham takes a great interest in the development of maternity and child welfare work and gives an excellent account of the object and fundamental importance of such work and of the great necessity for its extension in India. The whole of this work requires consideration and direction all over India. Maternal death rates are very high all over India. European figures are 4 per 1,000 births, but some Indian towns return 64 per 1,000 and most are in the neighbourhood of 20. The results of an investigation into maternal mortality in Madras are given; puerperal sepsis accounts for 60 per cent. of the deaths; 6 per cent. of the confinements in Madras were in women under 15 years, and only one-third of the confinements received any skilled attention. The United Provinces have now a fully-qualified woman attached to the medical and public health departments. In most of the provinces the work is non-official, though assisted by Government and the Red Cross Society.

Public health administration in the provinces.—The system varies, in some executive health activities are mainly governmental, in others the local bodies are responsible, while others have both systems at work. Propaganda work is receiving more and more attention, some provinces like Bengal and the United Provinces have special publicity officers and departments. Magic-lantern lectures and cinemas are nowadays everywhere made use of for instructional work.

Industrial hygiene.—Very little accurate information is available regarding the effect of industry in general on health in India. Two special *ad hoc* health boards exist in the coal field areas of Jharia and Asansol, but they exist for the purpose of ordinary sanitary work and not particularly for industrial health.

The Government of India's obligations and interests in international health work are great and they are fortunate in having a representative so versatile and influential as General Graham. There is nothing to gain by concealment of defects or by pigeon-holing the records of work. General Graham has presented the difficulties of sanitary advance in India, and the scientific work in connection with the investigation and prevention of disease in India is no longer unknown or left in pigeon-holes but receives publicity in international scientific circles at the Office International d'Hygiene Publique and the Health Committee of the Health Section of the League of Nations. The Eastern Epidemiological Bureau of the League of Nations at Singapore has been presided over since its inception by General Graham and he deserves congratulations on the excellent work, epidemiological, co-ordinative and scientific, that has been accomplished and initiated since its start. A full précis is given of the session of the Health Section of the League of Nations at Geneva, where many important questions such as leprosy, malaria, and pilgrim traffic—subjects very important to India—were discussed.

A very useful statement of the research work carried out in India during 1928 is given in section VIII. This represents a large amount of solid scientific work on plague, entomology, malaria, kala-azar, biochemistry, rabies, the bacteriophage, helminthology, nutrition, and skin diseases.

The report closes with a short résumé of the sanitary conditions in Indian jails. The average jail population in 1928 was 135,494 including the Andamans. The constantly-sick rate was 21.3, and the admission-to-hospitals rate 513.3. The death rate was 12.94. Even making allowances for the special classes of people in jails and the age and sex incidence, the figures are low and support the contention that the jail population is in a better condition of health than the outside population of a similar class. There is still much overcrowding, however, in the jails of many provinces.

It is hoped that General Graham's report will be as widely read as it deserves to be.

ANNUAL RETURNS OF THE HOSPITALS AND DISPENSARIES IN BIHAR AND ORISSA FOR THE YEAR 1929. BY COLONEL W. M. HOUSTON, M.B., V.H.S., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, BIHAR AND ORISSA. PATNA: SUPERINTENDENT, GOVERNMENT PRINTING, BIHAR AND ORISSA. 1931. PRICE, Rs. 3.

SOME of the more important features of this report are given below:—

Number of dispensaries.—There were 680 hospitals and dispensaries on 1st January, 1929, and 673 on 31st December, 1929. The number of hospitals and dispensaries

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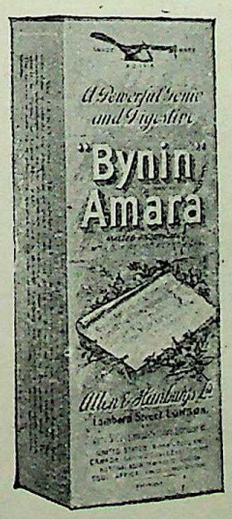

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AN INTRODUCTION TO

TROPICAL PATHOLOGY.

BY

T. BHASKARA MENON, M.D., M.R.C.P.,

(Acting Professor of Pathology, Medical College, Vizagapatam; Sometime Assistant Professor of Pathology, Medical College, Madras.)

WITH A FOREWORD BY

MAJOR-GENERAL C. A. SPRAWSON, C.I.E., V.H.S., M.D., F.R.C.P., LL.D., I.M.S.,

Surgeon-General with the Government of Madras, Madras.

Extract from Preface:

The novel idea of writing a textbook of pathology where each disease process is considered as a whole instead of piecemeal is that of Professor G. W. MacCallum who has shown us how morbid anatomy should be linked up with infectious processes. It is only by a study of this clinico-pathological parallelism that a true understanding of disease is possible. This book is an attempt to apply the methods of this teacher to those diseases which are of importance in the tropics. Descriptions of the morbid anatomy and histology of the commoner tropical diseases met with in India are, to some extent, the result of personal observation and will vary somewhat from those found in works on Tropical Medicine.

The book is intended mostly for undergraduate students in the tropics, where the requirements in pathology are somewhat different from those of students in Europe. It is hoped that this book will serve to introduce the student to the further study of those tropical diseases that he meets with in the wards and in practice in later life. It is also hoped that it will be of some use to the post-graduate student and to medical practitioners.

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TYPES OF BACTERIAL INFECTIONS.
Cholera Asiatica; Bacillary Dysentery; Plague; Undulant Fever; Leprosy; Oroya Fever.
TYPES OF SPIROCHÆTAL INFECTIONS.
The Relapsing Fevers; Rat-bite Fever; Infectious Jaundice; Yaws; Seven-day Fever.
TYPES OF INFECTIONS CAUSED BY FILTERABLE VIRUSES.
Yellow Fever; Dengue; Phlebotomus Fever.
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Mycetoma; Rhinosporidiosis.
TYPES OF INFECTIONS ASSOCIATED WITH RICKETTSIÆ.
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TYPES OF PROTOZOAL INFECTIONS.
Amœbiasis.
TYPES OF PROTOZOAL INFECTIONS.
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TYPES OF PROTOZOAL INFECTIONS.
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TYPES OF PROTOZOAL INFECTIONS.
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DISEASES OF UNKNOWN OR INDEFINITE CAUSATION.
The Beriberi Group; Pellagra; Sprue; Infantile Cirrhosis; Inguinal Granuloma.
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TYPES OF HELMINTHIC INFESTATIONS; NEMATODE INFESTATIONS.
Ancylostomiasis; Ascariasis.
TYPES OF INJURY.
Snake Poisoning.
APPENDIX I. IMPORTANT LABORATORY METHODS FOR THE TROPICS.
" II. AUTOPSIES IN THE TROPICS.

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opened during the year was 20. Of these 9 were opened by district boards—2 in Champaran and one each in Patna, Darbhanga, Bhagalpur, Puri, Ranchi, Palamau and Manbhum. Six dispensaries were opened by private bodies, *viz.*, four in Hazaribagh by the Ramgarh Wards Estate and one each in the Santal Parganas and Bhagalpur, and five by railway authorities. Of the 27 dispensaries closed during the year, 18 were maintained by district boards (*viz.*, 11 in Manbhum, 3 in Gaya, 2 in Hazaribagh and one each in the Santal Parganas and Singhbhum), 2 by private bodies and 7 by railways.

The district board of Manbhum have resolved to place 11 doctors with a subsidy of Rs. 25 per month each in those places in which dispensaries have been closed. Up to the end of the year, 7 such subsidised doctors joined the dispensaries.

Number and classes of patients.—The total number of indoor patients treated at the state, public, local-fund, and private-aided hospitals and dispensaries was 62,702 against 60,516 in the preceding year. There was an increase of 212,772 patients among those treated in the outdoor departments of these institutions, the numbers being 5,395,775 against 5,183,003 in 1928.

The number of in- and out-patients and the average daily attendance in hospitals and dispensaries in classes I, III and IV are as shown in the statement given below.

The increase in the figures is mainly due to the larger number treated in the districts north of the Ganges.

Government sanctioned a special grant of Rs. 7,500 for the purchase of urea-stibamine or other allied drugs for the treatment of kala-azar cases. The grant was distributed to *sadar* and subdivisional hospitals mostly in Bihar proper where the disease is largely prevalent.

Tuberculosis of the lungs.—Seventeen thousand one hundred and fifty-five cases of tuberculosis were treated in hospitals and dispensaries against 16,593 in 1928.

The Itki Sanatorium was partially opened in April 1929 and Indian patients were received into A class wards. Dr. E. R. Webb, the first Superintendent, was invalided to England owing to illness on 17th August, 1929, and the institution was placed in temporary charge of an assistant surgeon pending the appointment of a new Superintendent who was appointed after the close of the year under report. The admission of new patients was also suspended temporarily.

Filariasis.—During the year, 204 cases of filariasis were treated by antimony intravenously against 207 in 1928 at the Filariasis Hospital at Puri.

Leprosy and leper asylums.—Nineteen leprosy clinics worked during the year. Of these five clinics in the district of Puri and the Duff clinic at Supaul in the district of Bhagalpur were started during the year.

Year.	General dispensaries.		Female dispensaries.		Total average daily attendance.	
	Indoor.	Outdoor.	Indoor.	Outdoor.	Indoor.	Outdoor.
1928 ..	57,818	5,152,105	2,698	30,898	2,836.99	31,590.77
1929 ..	59,581	5,358,474	3,121	37,301	2,836.21	32,198.37

Number of patients.—The total number of in- and out-patients in all classes of hospitals and dispensaries in the province was 6,781,880 against 6,447,932 in the previous year.

Death rate.—The general health of the people in the province was not so good as in the previous year, the death rate amongst the general population being 26.9 against 25.3 per mille in 1928.

Cholera.—There was a considerable increase in the number of deaths from cholera, *viz.*, 104,034 against 77,103 in 1928. The number of cholera cases treated in hospitals and dispensaries also increased from 26,369 in 1928 to 32,592 in 1929.

Small-pox.—The number of deaths from small-pox decreased from 13,567 in 1928 to 6,671 in 1929. The total number of cases treated in the hospitals and dispensaries, however, increased from 638 in 1928 to 1,014 in 1929.

Plague.—Mortality from plague increased from 7,627 in 1928 to 8,266 in 1929. The total number of admissions in hospitals and dispensaries also increased from 1,472 in 1928 to 2,267 in 1929.

Malaria.—The number of deaths from fevers increased from 564,979 in 1928 to 602,038 in 1929. The total number of patients treated for malaria in hospitals and dispensaries also increased from 943,616 to 1,091,355.

Influenza.—During the year 46,986 cases of influenza were treated in hospitals and dispensaries against 51,841 in 1928.

Venereal diseases.—The number of patients treated in hospitals and dispensaries for venereal diseases (gonococcal infection and primary and secondary syphilis) was 74,039 against 74,138 in 1928.

The special grant of Rs. 12,000 sanctioned by Government for special treatment of venereal diseases was distributed amongst the *sadar* and subdivisional hospitals in charge of assistant surgeons and was fully utilized.

Kala-azar.—The attendance of patients suffering from kala-azar was 58,110 in 1929 against 41,866 in 1928. Five thousand one hundred and twenty-eight outdoor patients were treated during the year at those clinics.

Eight leper asylums with accommodation for 1928 patients worked during the year. At the instance of Government, outdoor patients are also being treated at those asylums. There were 1,607 indoor resident patients and 795 outdoor patients at the asylums. The total amount spent on their maintenance was Rs. 2,10,690 against Rs. 2,00,997 in 1928.

Radium Institute.—A separate report has been submitted to Government regarding the working of the Patna Radium Institute. Four hundred and thirty-seven patients were treated at the Institute during the year against 314 in the previous year.

Pasteur Institute.—Two assistant surgeons who received a full course of training at Kasauli in antirabic treatment are on the staff of the Patna Pasteur Institute which was opened on the 15th August, 1929, in the buildings of the pathological department of the Patna Medical College Hospital. In the laboratory attached to the Institute vaccine is manufactured. Antirabic treatment is given daily at the outdoor department of the Medical College Hospital. 1,107 patients were treated up to the end of the year.

Income and expenditure.

During the year the income from all sources of all hospitals and dispensaries in classes I, III and IV excluding opening balances amounted to Rs. 34,36,999 compared with Rs. 31,82,147 in the preceding year. The total expenditure on maintenance of these institutions excluding the amount invested was Rs. 32,87,362 against Rs. 31,05,273 in 1928.

REPORT OF THE LEPER HOSPITAL, RAWALPINDI, FOR THE YEAR 1930.

During the year 1930 the total number of cases treated in the Leper Hospital, Rawalpindi, was 86. Out of these 17 cases left within two months of their admission, and 11 cases have not been under treatment

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long enough to warrant any results; 58 cases have been under regular treatment throughout the year. The following is an analysis of these cases:—

Symptom-free cases discharged	7
Symptom-free cases still under treatment ..	9
Improved cases	36
No improvement	3
Worse	1
Died	2

There were 16 symptom-free cases, of whom 9 are still under treatment, and 7 have been discharged after keeping them under observation for at least one year. These cases are 27 per cent. of the total number.

Hydnocarpus oil with 4 per cent. creosote is mainly relied on for injections and considerable attention is paid to the general physical welfare of the patients.

Correspondence.

A NOTE ON STOVARSOL.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—We are all familiar with the condition of bowel disorder referred to generically as a "weak tummy," common in the hot weather, especially among Europeans. Attacks of diarrhœa are frequent and provoked by the least chill or dietary indiscretion; sometimes constipation alternates with the diarrhœa, and the purgatives start off the vicious circle anew.

For some time I have been using Stovarsol (May and Baker) as a means of regulating bowel action and have found it to be of very real value.

My practice is to order two tablets a day for a few days until the motions acquire the peculiar odour and consistency which follows its use (and which the patients readily come to recognize) and thereafter one tablet every two days or even less often.

The correct dose is that which will ensure regular motions, neither too hard nor too loose.

Its prolonged use seems to have no ill effects, and it is in fact an excellent tonic as well as being of prophylactic value against amœbic dysentery.

I should be interested to learn if others have had a similar experience of this use of the drug.—Yours, etc.,

G. H. FITZGERALD,
CAPTAIN, I.M.S.,
Civil Surgeon.

KAMRUP,
ASSAM.

INSUSCEPTIBILITY TO VACCINATION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Dr. Mukerjee's letter in the May number of the *Gazette* on the above subject prompts me to record an experiment I made 20 years ago. A lady friend, who was looking forward to the arrival of her first child, was induced by me to accept vaccination (although both she and her husband had previously been vaccinated on several occasions), in the month of November 1911, late in pregnancy. My object was to see whether immunity to small-pox and vaccination could be transmitted through the placenta to the fœtus, since it has been reported that small-pox can occur *in utero.* The baby arrived about the middle of December 1911. The child, now a young lady, has never been successfully vaccinated though repeatedly done by many medical men. Nor has she been afflicted with small-pox though here again she has been repeatedly exposed to infection.

Here is a stimulating line of thought. Small-pox can be transmitted through the placenta to the developing fœtus *in utero* and success has attended the production of an immunity by vaccinating the prospective mother during pregnancy. One swallow does not make a summer, nor does one experiment prove anything very definite, but in this experiment lies one explanation of how a person may acquire immunity to vaccination and possibly also to small-pox.

Similarly, might it not be possible to produce a certain degree of immunity to the typhoid group by the use of T. A. B. vaccine in pregnancy? Two would be protected by one operation. In the case of twins, the "hat trick" would be accomplished.

Dr. Mukerjee's child appears to me to have acquired a natural immunity, and no apprehension or anxiety need be felt.—Yours, etc.,

J. E. LEONARD CHINAL, M.D., D.T.M., L.M.

MONGHYR,
17th May, 1931.

BLACK PIGMENTATION ON THE SKIN OF THE CHEEKS AND NOSE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I should be much obliged if you or any of your numerous readers would give me some information as to the name, causation and treatment of the bilateral and permanent pigmentation that appears on the skin of the cheeks and the bridge of the nose of many people, both men and women. In some people it is so indistinct that it requires careful observation to detect but others are so deeply pigmented that it can be noticed from a distance. The pigmented area of the cheeks differs in different people. In some there is only a spot, in others a somewhat extensive area. Pigmentation on the nose is more rarely seen.

As regards causation, some are of opinion that it is a sign of old age and suggests adrenal insufficiency. I do not know how far this is true as I have seen such pigmentation appearing in both old and young men and women. I have seen Addison's disease, a rare condition characterised by progressive weakness, muscular and cardio-vascular, by gastro-intestinal disturbances, and by pigmentation of the skin, resulting from disease of the suprarenal bodies and of the chromaffin tissue, but no such disturbances occurred in these cases, and the pigmentation is not widely distributed but limited to a particular spot.

Various creams and snows found in the market are used in these cases, but with no effect.—Yours, etc.,

N. C. CHAKRAVARTI, L.M.F.

SHUSUNG,
MYMENSINGH,
25th May, 1931.

[We submitted the above letter to Lieutenant-Colonel H. W. Acton, C.I.E., I.M.S., Director, Calcutta School of Tropical Medicine, who has kindly sent us the following note:—

"The condition Dr. N. C. Chakravarti describes is a pigmentary lesion of the skin known as chloasma symmetricum. Castellani first described it in the Cingalese, and I have frequently seen it amongst the more primitive races, such as the Santals, and also amongst those who have a mixture of Mongolian and the blood of other Indian races. The lesion occurs most commonly between the ages of 18 and 30, and again later on at the time of the menopause. I think it is just as frequent in men as in women. There are generally three patches of pigmentation, one on each malar bone and one on the bridge of the nose. The texture of the skin is not affected in any way. The lesions are most probably due to deficiencies occurring in the adrenal and gonad functions. What we advise for the treatment of these cases is injections of Neostibosan (Bayer 693 B) given in doses of 0.2 grammes, intravenously, every day for 10 to 12 doses. The complete course of treatment is 2.4 grammes for an adult. Locally we prescribe a lotion, mercury perchloride—1 to 2 grains, bismuth subnitrate—10 grains, tragacanth—10 grains with rose water to the ounce. On the pigmented areas the lotion should be lightly dabbed with some cotton-wool, once or twice

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a day, until the epidermis begins to desquamate slightly. Should the skin over these areas become harsh, a little bland oil can be rubbed on to the skin surface. In women we sometimes prescribe ovarian extract when there is reason to believe that there is dysfunction of the gonads. This adrenal dysfunction is very frequently due to diseases of the gut, such as chronic dysentery, or stasis."—EDITOR, *I. M. G.*]

AN INDIAN JOURNAL OF TUBERCULOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the May issue of the *Indian Medical Gazette*, Dr. Y. G. Shrikhande pleads for a separate journal on tuberculosis for India.

It is not the size of the country, as he suggests, which creates a demand for a special journal, but the number of tuberculosis institutions and tuberculosis doctors. For all the five Scandinavian countries, with about 300 tuberculosis institutions, there is only one special journal and even this is not written in a Scandinavian language, but in English, French, and German. In India with under twenty-five tuberculosis institutions the need for a tuberculosis journal is certainly not "obvious," and one cannot but believe that the doctors in these few institutions subscribe to the more important tuberculosis journals of the West.

In Great Britain, in spite of the two separate journals, the editors of the *Lancet* and the *British Medical Journal* constantly publish articles on tuberculosis, some of them very technical, and very important, even for the specialist. The publication of articles of this kind in a general medical journal is probably the only way of introducing modern advances and knowledge of tuberculosis to a large body of general practitioners and non-specialist doctors. In India, where up to now so little attention has been paid to tuberculosis and about which there is so little real understanding and knowledge, it is all the more necessary that articles on tuberculosis should be published in the chief general medical journals, and should not be hidden away in a small, special journal.

The chief thing is, after all, not to find room for all the articles dealing with tuberculosis sent for publication, but to have those articles published in a general medical journal which will give to the many thousands of general practitioners in India new and important information regarding tuberculosis, with which they would otherwise have no opportunity of being acquainted. Articles on tuberculosis, including tuberculosis in India, of interest mainly to the specialist, can usually find a place in the chief tuberculosis journals of the West.

In conclusion, I consider that it is very *fortunate* that we have at present in India no separate journal on tuberculosis.—Yours, etc.,

C. FRIMODT-MÖLLER, M.B., CH.B. (Copenhagen),
Medical Superintendent.

UNION MISSION TUBERCULOSIS SANATORIUM,
AROGYAVARAM, NEAR MADANAPALLE,
4th July, 1931.

NOVOCAIN AND SPLANCHNIC ANÆSTHESIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the report of the meeting of the Calcutta branch of the British Medical Association held on 13th March, 1931, published in the *British Medical Journal* of 6th June, 1931, the following appears:—

"Major S. N. Mukerjee.....The *x*-ray plates of a case of partial gastrectomy performed under local novocain and splanchnic anæsthesia were shown: the patient was the first in India to have this type of anæsthesia."

It is to the last portion of this sentence that I should like to draw attention, and to point out that Major Mukerjee's statement—which was, of course, made in all good faith—is probably not accurate. He does not mention the date of the operation under the anæsthetic in question, but it is reasonable to suppose that it was recently performed. During September 1927 the administration of local novocain and splanchnic anæsthesia was commenced in the Presidency General Hospital, Calcutta, and early in the following year I wrote a short paper, which you were kind enough to publish in the *Indian Medical Gazette* of March 1928; in this paper I described the technique, and recorded the observations made by Lieutenant-Colonel A. H. Proctor and myself on 12 cases in which this method of anæsthesia was used. The majority of the patients required a little light ether induction in addition to the novocain. Actually Lieutenant-Colonel Proctor did the first case, but most of the others were done by me. I have no definite information on this subject from other hospitals in India, but in the absence of any published reports and in view of the *prima facie* evidence that Major Mukerjee's operation was performed subsequent to September 1927 I think it may be claimed that the credit for using this method first in India belongs to Lieutenant-Colonel A. H. Proctor and myself. I agree with Major Mukerjee that it is possible to operate for an extended period with this anæsthetic without causing any shock to the patient.—Yours, etc.,

H. E. MURRAY, M.D., M.CH.,
MAJOR, I.M.S.,
Officiating Surgeon Superintendent.

PRESIDENCY GENERAL HOSPITAL,
CALCUTTA,
6th July, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

MAJOR-GENERAL J. D. GRAHAM, C.I.E., has been appointed to be a companion of the Most Honourable Order of the Bath.

The following officers have been appointed as Honorary Surgeons to the Viceroy, with effect from the 18th April, 1931—

Major-General C. A. Sprawson, C.I.E.
Major-General W. C. H. Forster.
Colonel W. M. Houston.
Colonel E. A. Walker.
Colonel J. Fuller-Good.

On the close of the Matheran season, Lieutenant-Colonel M. S. Irani, Superintendent of Matheran, to be on general duty at the J. J. Hospital, Bombay, in addition to his own duties.

On return from leave, Lieutenant-Colonel D. D. Kamat to be Civil Surgeon, Surat.

The services of Major H. S. Anand have been placed permanently at the disposal of the Government of the Punjab, with effect from the 25th February, 1931.

Major Jelal M. Shah is appointed as Specialist in Venereal Diseases for the Bombay Presidency from the afternoon of 2nd April, 1931.

On the close of the Mahableshwar season, Major B. Z. Shah, Superintendent, Mahableshwar, to be on general duty at the Sassoon Hospitals, Poona, in addition to his own duties.

Major A. C. L. O'Shee Bilderbeck has been confirmed as Health Officer of the Port of Bombay, with effect from the 20th July, 1930.

The services of Major R. H. Malone have been placed at the disposal of the Government of Burma, with effect from the 3rd November, 1930, for employment as Officiating Director, Pasteur Institute, Rangoon, during the absence on leave of Lieutenant-Colonel J. Taylor, D.S.O.

The services of Major C. S. V. Ramanan have been placed at the disposal of the Government of Madras for employment in the Madras Jail Department, with effect from the 22nd June, 1931.

Major S. N. Mukherji, on supernumerary duty at the Medical College Hospitals, Calcutta, is appointed

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as Superintendent of the Campbell Medical School and Hospital, Calcutta, *vice* Lieutenant-Colonel K. K. Chatterjee.

Major P. H. S. Smith has been appointed to officiate as Health Officer of the Port of Bombay from the 24th to the 31st March, 1931, in addition to his own duties in the Military Department and thereafter as whole-time Health Officer of the Port during the absence on leave of Major A. C. L. O'Shee Bilderbeck.

The services of Captain S. D. S. Greval, an Officer of the Medical Research Department, have been placed temporarily at the disposal of the Bombay Government.

The undermentioned appointments have been made to the I. M. S.—

To be Captain (on probation).

Edward Patrick Carroll, 3rd February, 1931.

To be Lieutenants (on probation).

Bertrand Temple-Raston, 3rd February, 1931, with seniority, 22nd June, 1929.

George Kenneth Graham, 3rd February, 1931, with seniority, 3rd February, 1930.

Alexander Wood West, 3rd February, 1931, with seniority, 3rd February, 1930.

Mazhar Hussain Shah, 30th April, 1931, with seniority, 10th February, 1930.

Macgregor Kirk Bryce. Dated 3rd February, 1931.

James Guthrie. Dated 3rd February, 1931.

Henry Brian Macevoy. Dated 3rd February, 1931.

Michael Matthew Mansfield. Dated 3rd February, 1931.

John Lawrence O'Neill. Dated 3rd February, 1931.

William Joseph Stewart. Dated 3rd February, 1931.

LEAVE.

Lieutenant-Colonel R. N. Chopra, Professor of Pharmacology, School of Tropical Medicine and Hygiene, Calcutta, is granted leave, with effect from the 15th July, 1931.

Lieutenant-Colonel T. L. Bomford is granted leave in extension of the leave for 1 year granted to him in a previous notification dated the 22nd November, 1930.

Lieutenant-Colonel R. H. Bott, C.I.E., Professor of Operative Surgery, King Edward Medical College, Lahore, has been granted leave for a period of 1 year, 2 months and 6 days, with effect from 16th May, 1931, preparatory to retirement.

Lieutenant-Colonel K. S. Singh, Civil Surgeon, Jullundur, has been granted leave for a period of 3 months and 20 days, with effect from 1st June, 1931.

PROMOTIONS.

Lieutenant-Colonel J. P. Cameron, C.I.E., was promoted to the rank of Colonel, with effect from the 15th February, 1931.

Captain G. H. Fraser was promoted to the rank of Major, with effect from the 25th May, 1931.

The promotion of Major J. H. Hislop, M.C., to the rank of Major has been ante-dated to the 27th July, 1923.

Lieutenant D. C. Chopra has been promoted to the rank of Captain (Provl.), with effect from the 19th November, 1930.

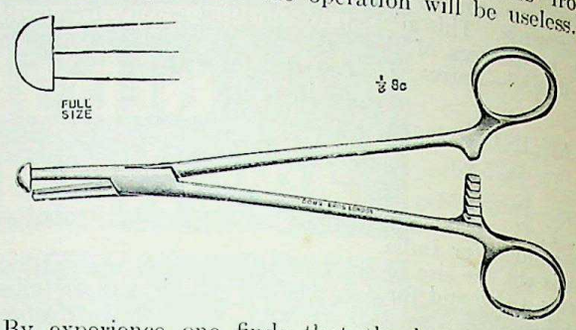
RETIREMENT.

Lieutenant-Colonel F. J. Kolapore has retired from the service, with effect from the 19th March, 1931.

Notes.

PHRENIC EVULSION FORCEPS.

IN performing the operation of phrenic evulsion the phrenic nerve is exposed in the neck under a local anæsthetic and grasped by fairly strong forceps. The nerve is then divided above the forceps and pulled slowly out from the chest cavity. The evulsion has to be very slowly proceeded with so that the nerve will be removed in as great a length as possible. If it is pulled out too strongly or too quickly the nerve may break. If this breakage occurs above the communicating branches which reach it below the clavicle, the diaphragm will still receive nerve impulses from these branches, so that the operation will be useless.



By experience one finds that the best way of controlling this gradual pull on the nerve is to rotate the forceps and wind the nerve on to them very slowly. If ordinary forceps are used, the nerve slips off the end, since the forceps cannot be kept on the same plane as the nerve which lies at the bottom of the fairly deep wound. To overcome this minor difficulty these forceps were produced. The round tip projects from the edges of the blade and so prevents the nerve from slipping over it. The blades themselves have longitudinal grooves, assuring a good grip of the nerve. The forceps should be of a fairly heavy type as this ensures a firmer and more complete control of the amount of force required.

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Original Articles.

A NOTE ON THE FORMATION OF LEPROUS NODULES IN THE HUMAN SKIN.

By JOHN M. HENDERSON, M.B., Ch.B. (Glas.),

Working under the British Empire Leprosy Relief Association, at the School of Tropical Medicine and Hygiene, Calcutta.

ONE of the best-known and most frequently described types of leprous skin lesion is the leprous nodule or nodular infiltration; such a lesion is evidence of a virulent infection of the skin by *M. lepræ* and of a minimum resistance of the affected area, and probably of the body generally, to the progress of the disease. The pathological basis of nodule formation would appear to be in all cases a bacillary embolus, and the naked-eye and microscopic appearances of a recent nodule depend on at least two main factors, (*a*) the depth in the skin at which the embolus lodges—with this is associated the size of the embolus in question—, and (*b*) the structure of the skin in the area in which the embolus lodges.

Spalteholz (1893) and Lewis (1927) in particular have shown that the arterial supply of the skin falls roughly into three parts. In the deepest layer of the corium, or true skin, where it joins the fat, there is a plexus of vessels known as the *cutaneous arterial network;* arched and branching vessels proceed outwards and anastomose to form the *subpapillary arterial network* near the junction of the middle and outer thirds of the corium; from this plexus numerous small branches arise and run as terminal arterioles to the superficial layers of the skin, and send their twigs to the arterial limbs of the vascular loops lying in the papillæ of the corium. From these different plexuses branches are given off for the supply of the hair follicles, the sweat glands and the sebaceous glands. If, then, the embolus lodges in one of the superficial vessels we have the superficial type of nodule projecting more or less prominently from the general skin surface over which the epithelium is stretched as a thin tense layer. If, on the other hand, the embolus is caught in one of the deeper skin vessels, the deep type of nodule, more easily detected by touch than by sight, is the result; all the changes take place in the deeper skin levels and the epithelium is, in the early stages at least, freely movable over the underlying granuloma.

It is, we think, possible that the intimate structure of the small blood-vessels plays a part in determining nodule formation in particular areas. Wetzel and Zotterman (1926), for example, have shown that the diameters of the capillaries and small venules are greater in the skin of the lobes of the ears and cheeks than in other parts of the general body surface. Whether this anatomical peculiarity, aided in the case of tropical climates by the traumatic action of intense light-rays, has any bearing on the very common location of leprous nodules in these areas it is difficult to say but the observation is suggestive. The amount and density of fibrous and elastic tissue in different parts of the skin must also aid in determining the occurrence, now of the more or less prominent and projecting nodule, now of the more diffuse horizontal spread—the so-called nodular infiltration.

Histology of the nodule.—In favourable sections of young nodules one can detect the embolization which is the basis of nodule formation. There is dilatation of one or more capillaries with spattering of acid-fast leprosy bacilli on the endothelial cells of the capillary wall. There is some œdema of the surrounding connective tissue with bacilli in the dilated lymph spaces and in the mobilised phagocytes (or histiocytes) (fig. 1). The subsequent course of events depends on the extent and direction of spread of the leproma and, *pari passu*, on the resistance offered by the surrounding tissues to such spread. The life-history of the nodule is also modified by the incidence of secondary infection from the skin surface—such a complication naturally occurs more frequently in the superficial than in the deep type of nodule—and, lastly, by the extent to which the nodule becomes involved in the general systemic disturbance known as the leprous reaction, or lepra fever.

The microscopic appearances of the fully developed nodule have been so frequently described that there is no need of repitition here; it may be noted, however, that in our experience multinucleated giant-cells are uncommon at this stage. This negative finding lends additional support to the view that nodule formation in its early stages is relatively an acute process and that the tissues make little effort to limit its spread. In nodules which have persisted for some time we have noted a curious appearance in sections subjected to silver impregnation *ad modum* Levaditi; the granulation tissue is orange-yellow in colour, contrasting with the greyish-brown of the surrounding healthy tissue; even more interesting, however, is the sharp demarcation of the granulation tissue from the underlying healthy tissue (fig. 2). Sections of nodules tending towards resolution stained by Ziehl Neelsen's method reveal considerable numbers of cells with acid-fast granular contents. Such cells are probably proliferated mast cells of the connective tissue, although it has been suggested that the granules are related to leprosy bacilli just as the so-called Much granules are believed to be related to tubercle bacilli (fig. 3).

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Leprous nodules in the reactionary phase show certain features of interest: (*a*) Many of the lepra cells break down; these cells are ordinary tissue histiocytes which have been mobilised and become crammed with leprosy bacilli. Appropriately-stained sections show that fatty degeneration of the cell protoplasm is a preliminary to this breaking-down process (fig. 4). (*b*) Polymorphonuclear leukocytes invade the leprous granulation tissue in appreciable numbers. At this stage leprosy bacilli can often be detected inside such cells; in the quiescent phase polymorphonuclears are uncommon (fig. 5). (*c*) Diapedesis of red blood cells may occur. (*d*) Infiltration may take place into the subepithelial streak of corium which normally is almost free of bacilli and cells. Where the reactionary phase persists for some time there may occur liquefaction of the granuloma, breaking down of the over-lying epithelium and discharge of the contents of the nodule on the skin surface.

The end stage of the nodule is represented either by a gradually increasing fibrosis with disintegration of the foci of lepra cells, sclerosis of the small blood-vessels of the granulation tissue and progressive diminution of acid-fast bacilli with a proportionate increase of granular forms, or by an invasion of the nodule by polymorphonuclear leukocytes with or without secondary pyogenic infection, liquefaction and discharge of the contents of the nodule and healing of the resulting ulcer from the bottom.

My thanks are due to Mr. S. Ghosh, the technician to the Leprosy Research Department, the School of Tropical Medicine, Calcutta, for the care he has taken in the preparation of the microscopic sections, and to Mr. J. K. Mullick, the artist to the same department, for the illustrations.

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AN INVESTIGATION OF AFTER-HISTORIES OF SANATORIUM PATIENTS IN INDIA.

By C. FRIMÖDT-MOLLER, M.B., CH.B. (Copenhagen),

Medical Superintendent, Union Mission Tuberculosis Sanatorium, Arogyavaram, near Madanapalle.

IN judging the value of sanatorium treatment one must not only examine the immediate results of the treatment at discharge, but also, what is after all more important for the patient, the after-results of the treatment. It is common to hear it said that patients who have been in a sanatorium may be fairly well when they leave, but that they usually break down very rapidly some time after they have left the special care of the sanatorium. Whether this statement is true or not can only be decided by a careful investigation of the after-histories of these patients.

One of the chief factors in such an investigation is to know whether only very early cases are included or also advanced cases, and, if both are included, the proportion between the two.

There is an idea in India, shared even by some prominent doctors, that a tuberculosis sanatorium treats only early cases which might be cured anywhere by rest, fresh air and good food. This conception is totally out of date and is not in accordance with what is found in modern sanatoria.

During the last twenty to thirty years, all over the world, patients with the disease in the advanced stages have been admitted in steadily increasing numbers to sanatoria, because the modern sanatorium treatment has revealed the fact that it is often just in the most desperate cases that the best results are obtained.

In the Union Mission Tuberculosis Sanatorium, at Arogyavaram, near Madanapalle, during the last ten years we have admitted considerably more advanced cases than during the first five years. This is seen in the following tables.

TABLE I.

The stages of the disease in patients admitted during 1916–30.

	Patients admitted.	I stage.	II stage.	III stage.
		Per cent.	Per cent.	Per cent.
1916—20 ..	807	29·5	46·5	24·0
1921—25 ..	737	19·8	25·6	54·6
1926—30 ..	1,231	22·5	24·3	53·2

It will be seen that during the last ten years more than half the number of patients was in the third or the most advanced stage of the disease.

In India the difficulty of tracing many patients after discharge, due to factors such as illiteracy and lack of facilities of communication, is a great handicap to collecting reliable figures as to the fate of patients in later years. In our investigation of the fate of the patients who have been away from the Sanatorium for five years or more we have been able to collect information about 964 out of 1,544 patients discharged; 580 patients could not be traced. The question is how does this number of untraceable patients affect the reliability of our figures expressed in percentages in the following statistics regarding the after-histories of the patients? In order to determine this we have investigated who our untraceables were in relation to the different stages of the disease and to the immediate results at the time of

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Fig. 1.—Section of young leprous nodule stained Ziehl-Neelsen's method. (*a*) Capillary with *M. lepræ* in lining endothelial cells. Eyepiece 8 × Zeiss, objective 1/12th inch Oil Imm. Magnification 720 ×.

Fig. 2.—Section of leprous nodule stained by Levaditi's silver stain, counterstained Weigert Fuchsin. Eyepiece 10 × Zeiss, objective A2. Magnification 20 ×.

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Fig. 3.—Section of leprous nodule after 3½ years' treatment stained by Ziehl-Neelsen's method to show cells with acid-fast granular contents. Eyepiece 7 × with 1/12th inch Hom. Imm. Magnification 630 ×.

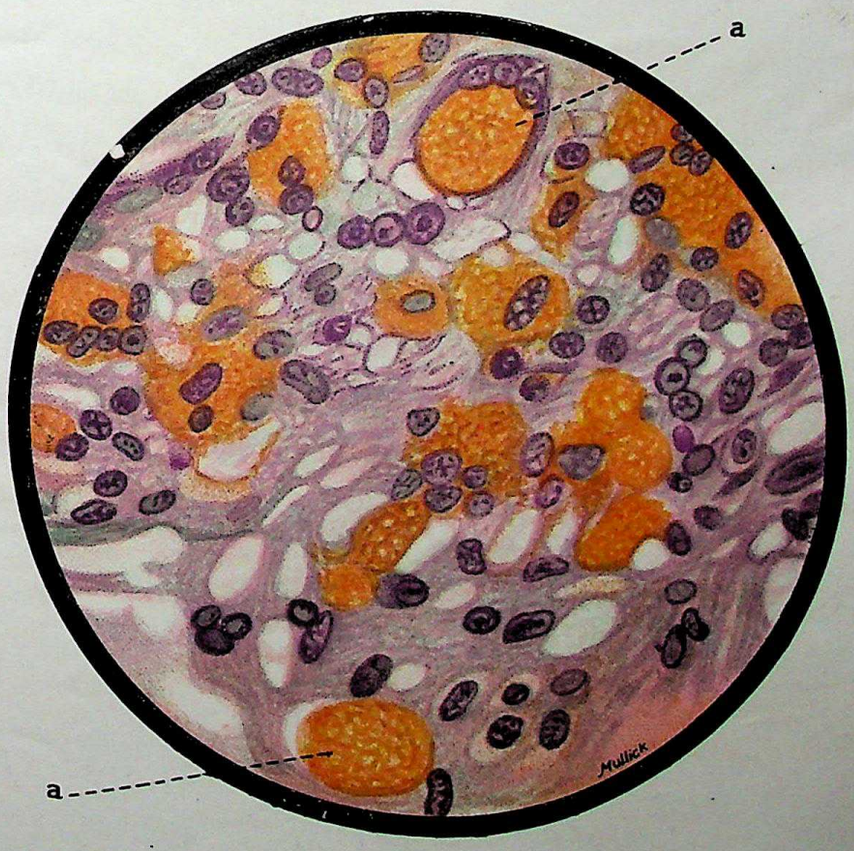

Fig. 4.—Skin in leprous "reaction" showing fatty degeneration of proliferated endothelioid cells. (c) Frozen section stained Sudan III—Haematoxylin. Zeiss Hom. Oil Imm. 1/12th inch. Eyepiece K7. Magnification 630 ×.

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discharge, compared with the traced, and we have found, as shown in table II, that there is very little difference between the two groups in relation to these two factors. The probability is therefore that even if we knew the fate of all the untraceable patients, the proportion of living and dead would not be materially altered.

TABLE II.

Traced and untraced patients with regard to stages on admission and results on discharge, 1916–25.

I STAGE.

Number of Patients.	384	Traced 257 / Untraced 127		
	Per cent. of arrested.	Per cent. of much improved.	Per cent. of improved.	Per cent. of worse.
Traced ..	72·4	18·7	6·2	2·7
Untraced ..	67·7	18·1	12·5	1·7

II STAGE.

Number of Patients.	564	Traced 324 / Untraced 240		
	Per cent. of arrested.	Per cent. of much improved.	Per cent. of improved.	Per cent. of worse.
Traced ..	37·0	33·7	13·3	16·0
Untraced ..	25·4	35·0	19·6	20·0

III STAGE.

Number of Patients.	596	Traced 383 / Untraced 213		
	Per cent. of arrested.	Per cent. of much improved.	Per cent. of improved.	Per cent. of worse.
Traced ..	1·3	23·5	23·2	52·0
Untraced ..	1·9	19·7	21·2	57·2

Investigations in the West of the after-histories of sanatorium patients have shown, as do also our statistics, that the greatest number of patients, who die after discharge, die within the two first years after leaving the sanatorium, while patients who have survived more than five years have a very good prospect of not dying of tuberculosis. We find on reports of 1925, that the total number of deaths from tuberculosis amongst the traceable patients was 351 out of 1,330 patients discharged during 1915–24. Out of the 351 not less than 310 patients died within the first two years, while after a period of five years only 10 died. In the following the statistics comprise those patients only who have been away from the sanatorium for five years in each case, as we consider this investigation gives completely reliable information about the value of sanatorium treatment in relation to the fate of the patients later in life.

During the years 1916–25 there have, as already mentioned, been discharged 1,544 patients who have been away from the Sanatorium for fully five years or more in each individual case. Omitting the 580 untraceable cases we find that out of 964 patients discharged, which number includes the most advanced cases, 492 or 51.0 per cent. were alive after five years and that of these 448 or 46.5 per cent. were doing full work. These figures, with the untraceables omitted, are, in spite of this omission, probably fairly correct for the reason mentioned above when the question of the untraceables was raised. But even if we were to consider all the untraceables as dead, which it is of course impossible to believe, we should still find that out of 1,544 patients, there were, five years after discharge in each case, 31.9 per cent. alive and 29.0 doing full work.

The result of the treatment is brought out far better by considering the fate of the patients both with regard to the different stages and to the immediate results on discharge. This investigation is shown in table III.

In I stage it will be seen from the table that we find that out of 257 patients traced 214 or 83.3 per cent. were living 5 years after discharge. We know also, but this is not shown in the table, that all but 13 were doing full work, and of these thirteen 11 were doing half work.

In II stage we find that out of 324 patients traced 207 or 63.9 per cent. were living, and we know that all of them but 20 did full work; of these last mentioned 16 did half work.

In III stage we find that out of 383 patients traced 71 or 18.5 per cent. were living and 60 were doing full work, while 7 did half work.

If we consider the results in relation to the immediate results on discharge, we find the following interesting facts:

In I stage we find that of the patients traced among those discharged as 'arrested' not less than 87.6 per cent. were living five years after. Of those discharged as 'much improved' 81.3 per cent. were living, and of those discharged as only 'improved' 75.0 per cent.

In II stage we find that of those discharged as 'arrested' 83.3 per cent. were living, of the 'much improved' 68.8 per cent., and of the 'improved' 50.0 per cent.

In III stage we find the number of 'arrested' is too small to calculate as a percentage, while of the 'much improved' 50.0 per cent. even of these the most advanced cases were living,

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TABLE III.

Nine hundred and sixty-four patients traced 5 years after discharge; discharged during 1916–25.

	I STAGE.											
	Arrested.			Much improved.			Improved.			Worse.		
	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.
1916—20	107	93	86·9	22	16	72·7	13	10	76·9	2	0	..
1921—25	79	70	88·6	26	23	88·5	3	2	..	5	0	..
1916—25	186	163	87·6	48	39	81·3	16	12	75·0	7	0	..

	II STAGE.											
	Arrested.			Much improved.			Improved.			Worse.		
	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.
1916—20	82	67	81·7	59	33	55·9	24	12	50·0	39	9	23·1
1921—25	38	33	86·8	50	42	84·0	18	9	50·0	14	2	14·3
1916—25	120	100	83·3	109	75	68·8	42	21	50·0	53	11	20·8

	III STAGE.											
	Arrested.			Much improved.			Improved.			Worse.		
	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.	Traced.	Living.	Per cent.
1916—20	3	1	..	28	10	35·7	25	3	12·0	62	2	3·2
1921—25	2	2	..	62	35	56 5	64	16	25·0	137	2	1·5
1916—25	5	3	..	90	45	50·0	89	19	21·4	199	4	2·0

and of the 'improved' as many as 21.4 per cent. five years after discharge.

From a study of table III it will further be seen how much better results were obtained among the patients treated during 1921–25 compared with those treated during 1916–20. The most striking difference is found among those discharged as 'much improved' and especially among those in II and III stages. This is of great importance as it confirms our statistics for the immediate results on discharge. In table IV it will be seen how much better the results are year by year. The table comprises those patients who have been discharged as 'clinically well,' that is to say, those who are discharged as 'arrested' and 'much improved.'

TABLE IV.

Percentage of patients discharged as 'clinically well' during the three five-year periods; 2,775 patients.

	I STAGE.	II STAGE.	III STAGE.
	Per cent.	Per cent.	Per cent.
1915—20 ..	86·9	62·7	24·7
1921—25 ..	93·1	73·6	23·1
1926—30 ..	94·8	76·8	34·3

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As from table III it is seen that improved immediate results mean improved after-results, we have every reason to hope that the still further improvement of the immediate results in 1926–30 will mean corresponding increase in the number of patients living and working 5 years after discharge, when this investigation comes to be made.

The improvement so strikingly brought out in table IV is due to the modern development of sanatorium treatment. The routine in a sanatorium which has kept pace with modern discoveries and experiences in the treatment of tuberculosis, makes it an institution totally different from the pioneering sanatoria, in which the so-called 'open-air treatment' was carried out. The back-bone of modern sanatorium treatment is not only fresh air, good food and other hygienic measures, but is a special treatment, carried out best under open-air conditions, consisting of a change between rest and graded exercises regulated according to the resisting power against the disease in each individual case. The regulation of this change is in a modern sanatorium not only based upon the experience gained during half a century from the observations of the clinical symptoms of the patients in relation to their rest and exercise, but is now also based upon guiding facts obtained by examination of the blood, such as the sedimentation test of the red blood corpuscles and differential counts of the white blood cells. The modern research on the immuno-biological aspects of tuberculosis has not only explained why this change of rest and graded exercise constitutes the all-important basis for the whole treatment, but it has also helped to improve the treatment in many ways.

There are now also at our disposal in a modern sanatorium methods and remedies which in many cases give the greatest support to the sanatorium treatment proper, and often bring about the most surprising results even in the most advanced cases. These methods and remedies are artificial-pneumothorax treatment, other operations like phrenico-exairesis, thoracoplasty and burning through of adhesions in the pleural cavity. Among modern remedies should be mentioned injections of various heavy-metal salts, calcium injections, and autovaccines. The old remedy tuberculin is of help as well in certain selected cases. To this may be added the laboratory research, making possible the treatment of complications on a real scientific basis. This is especially necessary in the tropics.

It is worth pointing out that improvement in the results of modern sanatorium treatment is especially noticeable amongst the most advanced cases, where improvement was most needed, and thereby the real value of this treatment is demonstrated.

The investigation of the after-histories brings out one more fact, and that a most astonishing one. It will be seen from table III that the patients in the I and II stages of the disease have practically as great a possibility of getting on well later in life whether they are discharged as 'arrested' or as 'much improved.' This is manifested most clearly when the last five-year period, 1921–25, is considered.

Nothing better demonstrates the value of sanatorium treatment than these good after-results of the treatment for the patients discharged as 'much improved' compared with those discharged as 'arrested.' Those who are discharged as 'much improved' still show signs of having the disease to a considerable extent. They have nearly always tubercle bacilli in their sputum and râles and other physical signs of the disease to be heard in their lungs at the time of discharge. They have nevertheless become 'clinically well,' which is to say that they are able to be exposed to the higher degrees of graded exercises without showing any symptoms of activity of the disease, either through the clinical symptoms or by examination of the blood. This is because they have been sufficiently long under the sanatorium treatment to have had the immuno-biological defence of the body worked up to such an extent that it is able to guard them against intoxication from the foci and against the power of the tubercle bacillus to create new lesions or extend the old ones.

Summary.

1. The investigation of the after-histories comprises 1,544 patients discharged during 1916–25 and who have all been discharged from the sanatorium for a period of 5 years or more.

2. About one-fourth only of the patients were early cases, while more than one-third were in the most advanced stage of the disease.

3. Of 1,544 patients 580 could not be traced 5 years after discharge, but an examination of the records of these patients in relation to the stages of the disease on admission and the immediate results on discharge, compared with those of the patients traced, shows very little difference between the two groups. Judging from this the after-histories of the two groups may be expected to be very similar, and therefore percentages, omitting the untraced, are in this investigation approximately correct.

4. Of the 964 patients traced, including the most advanced cases, 51.0 per cent. were living 5 years after discharge, and 46.5 per cent. were doing full work.

5. Examined with regard to the stages of the disease on admission of the patients to the sanatorium the after-histories show that in I stage out of 257 patients traced 214 or 83.3 per cent. were living 5 years after discharge, in II stage out of 324 patients 207 or 63.9 per cent., and in III stage out of 383 patients 71 or 18.5 per cent.

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6. Examined with regard to the immediate results of the treatment on discharge the after-histories show that in I stage of the patients traced among those discharged as 'arrested' not less than 87.6 per cent. were living five years after, of those as 'much improved' 81.3 per cent. and of those as 'improved' 75 per cent.. In II stage the corresponding figures are 83.3, 68.8 and 50.0 per cent. In III stage the number of 'arrested' is too small to calculate as a percentage, while of those 'much improved' 50.0 and of 'improved' 21.4 per cent. were living. It should be remembered, as stated above, that practically all those who are living after 5 years are doing full work.

7. An improvement of the immediate results of treatment on discharge of the patients in the second five-year group is followed by a corresponding improvement in the after-results.

8. In the second five-year group the patients discharged as 'much improved,' in the I and II stages, have been shown to have a chance in life, 5 years after discharge, almost equally as good as that of those discharged as 'arrested' in the same stages. This was not so in the first five-year group. The difference is due to the benefit received by the second group from the later development of modern sanatorium treatment.

FIVE CASES OF JUVENILE MEGALO-COLON.

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DURING the last six years five cases of well-marked megalocolon in children have come under the writer's treatment. Two other patients, showing dysfunction and considerable distortion of the colon, have not been included in the present article as the degree of dilatation was but slight and they would therefore come more correctly under the heading of redundant colon.

The five patients described below were the children of European parents in comfortable circumstances, two boys and three girls. The condition has not been labelled Hirschsprung's disease as the degree of enlargement was not that commonly associated with this condition and two at least showed definite causative mechanical obstruction.

The diagnosis, in three cases, was verified by means of *x*-ray photographs of barium enemata; in the other two, the clinical evidence, the marked distension of the abdomen with visible peristalsis of the colon, was sufficiently clear to warrant the conclusion that the disease was megalocolon. In order to facilitate reproduction the *x*-ray plates have been reduced to diagrammatic form drawn to scale. Dr. Galstaun has been good enough to check the diagrammatic reproductions with the original plates.

The predisposing causes of megalocolon are still a matter of discussion, but it is admitted that a proportion are secondary to obstruction, either from a narrowed anal canal and spasm of the sphincter ani, or from kinking of the sigmoid or of some part of the colon proximal to this. Of the five cases noted two showed definite anal spasm and in two others there was sufficient distortion and kinking to lend colour to the suggestion that here again the primary condition was obstructive. The visible and active peristalsis is sufficient testimony that the condition is not due to atony.

Case 1.—E. S., female, aged 2 years (figure 1). Well-marked general enlargement of the colon;

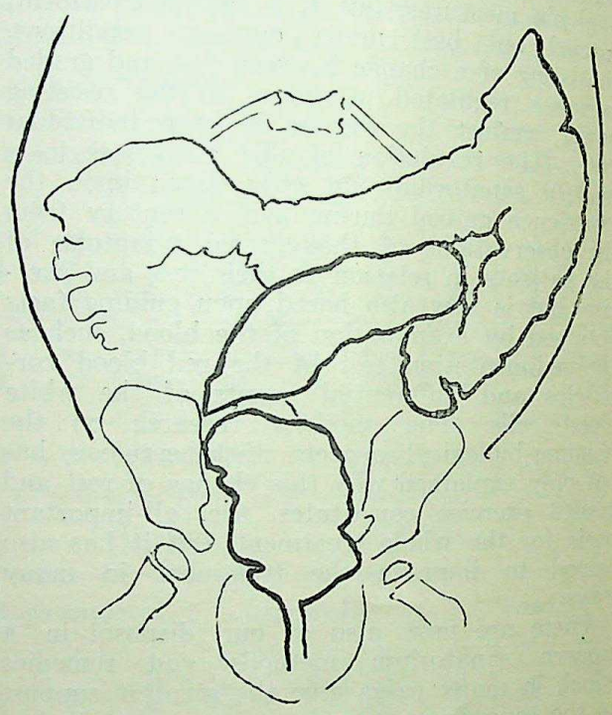

Fig. 1.

In this and in figures 2 and 3 the thick outline denotes complete filling and the thinner lines proportionate density of the shadows.

a loop in the descending colon and a kink between the sigmoid and the rectum.

The child is reported to suffer from periodic attacks of fever leading up to which there is marked irritability and negativism, with loss of appetite.

The mother, on further questioning, states that the child has from birth strained at stool, often crying and becoming blue in the face. She was treated for dysentery at the age of eight months, but there was no laboratory confirmation of the diagnosis and it is probable that the condition was one of colitis due to stasis.

The child is poorly nourished and fretful. The abdomen is protuberant—there is visible peristalsis in the track of the transverse and of the descending colon.

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The anus is distinctly tight and it was found difficult to pass a rectal tube, and, having done so, to induce the saline bowel wash to flow. The results of the bowel wash are bulky with much intestinal sand.

The urine contains a heavy deposit of oxalates and some red blood corpuscles.

The child seen six months later appeared to have improved in general health, but had not been free from attacks of colitis with the passage of much intestinal sand. She had gained four pounds in weight.

In England two years later, *x*-ray photographs were again taken of a barium enema. The report was as follows:—The anal canal is somewhat narrow and there is rectal stasis. The pelvic colon takes an abnormally large loop while the colon proximal to this is normal. Compared with the last photographs there is improvement and the marked kinks in the descending colon have disappeared. The general health at this time was reported to be much improved.

Three years later, that is, five years after the inception of treatment, the general health was reported satisfactory.

Case 2.—D. E., female aged 2½ years, reported to suffer from sleeplessness and such restlessness during sleep that she crawls all over the bed. Daily evacuation of the bowels.

A well-nourished child, up to standard physically and mentally, of good colour, but dark under the eyes and with skin-staining of the lower abdomen. The abdomen is protuberant and there is well-marked visible peristalsis of the descending colon running obliquely across the abdomen from the splenic region to the right iliac fossa. The anal sphincter is resistant to the entry of the little finger and above the sphincter can be felt a sharp-edged ring of mucous membrane. The child was under treatment for a short time only as she left the station, but after the sphincter had been dilated and the bowel cleared, sleep became normal.

Case 3.—R. W., male, aged 18 months.

Reported to have stopped sweating for the last ten days and to vary in bodily temperature according to the amount of covering. Is liable to periodic attacks of "biliousness" with constipation.

The child is small for his age, is poorly nourished and has suffered recently from boils. The appetite is said to be voracious. There is usually a daily evacuation of the bowels. The abdomen is markedly enlarged, with a wide diastema recti and eversion of the lower ribs. There is visible peristalsis of the transverse and of the descending colon.

The liver is palpable two fingerbreadths below the costal margin.

Urine.—Acetone and uric acid in abundance.

After two months' treatment there was improvement in the general health and the abdomen was less prominent.

One month later there was a temporary recurrence of acute digestive disorder with loss of appetite, fever, vomiting and constipation; acetone and uric acid reappeared in the urine.

Two months after this the child appeared well, though there was still considerable abdominal prominence.

Shortly afterwards the child left for England and was reported five years after as being fit and well.

Case 4.—A female child, aged 6 years (figure 2). Owing to extreme nervousness of the subject, it was not possible to take the final

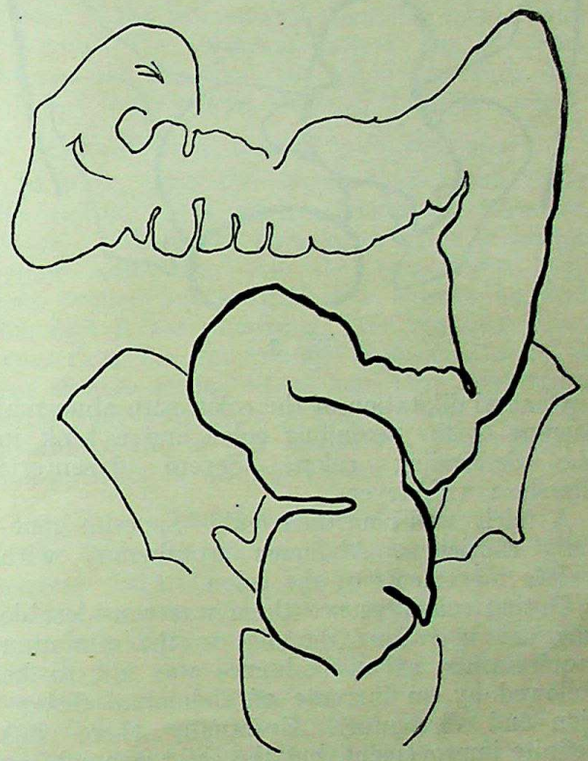

Fig. 2.

skiagram when the enema had reached the cæcum.

The transverse, the descending and the sigmoid colon are, however, shown to be markedly dilated with a kinked pelvic colon and an apparent loop at the hepatic flexure.

The child has been subject to recurrent attacks of ill-health associated with the passage of large fermented stools containing mucus. In the intervals the bowels are moved daily but in insufficient quantity, and there is undoubtedly "hoarding."

The child is tall and thin, but fully active both mentally and physically. During the attacks the appetite is poor and there is abdominal pain. The abdomen is protuberant and there is a palpable sensation as of an enlarged ascending colon and cæcum. The urine contains acetone. Rectal saline washouts result in the passage of vast fermented greenish stools. Under treatment there was marked improvement though strict dieting was necessary so long as the child was in India, and the attacks of diarrhœa became less frequent.

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Case 5.—G. M., male, aged 15 months (figure 3).

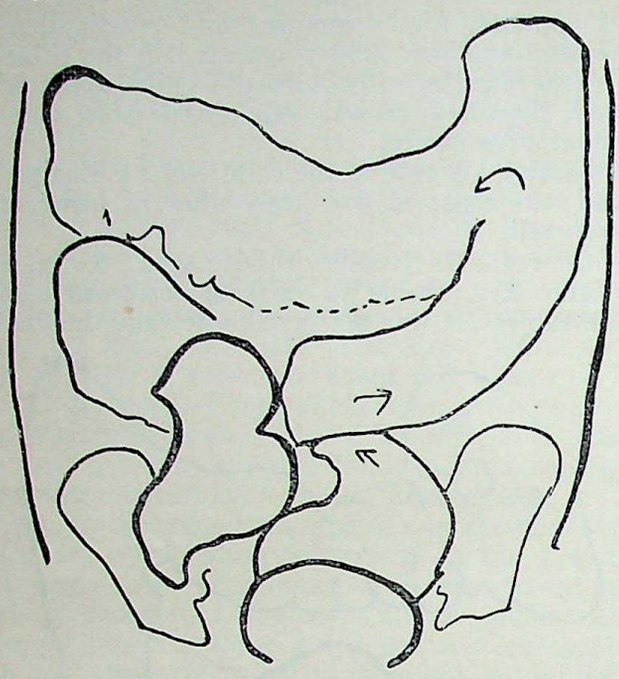

Fig. 3.

General dilatation of the colon with abnormal looping of the ascending colon and a kink in the descending colon. Severe dysenteric diarrhœa with fever.

A fairly well-nourished child—appetite generally capricious. Abdomen protuberant with visible movements of the colon.

During convalescence there was considerable difficulty in raising the diet to the minimum requirements, as any advance was apt to be followed by an increase of abdominal distension and discomfort. Eventually there was definite improvement, but the child was subject to relapses.

The aim of treatment was to clear the bowel as far as possible and at the same time administer a diet which contained little residue likely to cause further distension; thus, the following diet was administered to a child of eighteen months:—Milk—30 oz., glucose—½ oz., gelatine—½ oz., Robinson's barley—2 oz., fruit jelly, bread and butter, and fruit juice.

On the evidence of the active visible peristalsis, it was assumed that the distension was due to some degree of obstruction rather than to atony, and purgatives were as far as possible avoided. In one case it was necessary to give salines in order to render the motions more liquid. Liquid paraffin was used freely.

High lavage of the colon with normal saline was employed on alternate days at the start and twice a week later. Rectal injections of olive oil in amounts from 2 to 6 ounces, retained as long as possible, were of special value as they did not cause the irritation which a protracted course of bowel washes is prone to induce. In one case the child was able to retain the oil overnight, thus ensuring a free evacuation in the morning. In all cases gentle massage to the abdomen in the line of the colon was carried out. The above five cases show certain points of interest:—

(*a*) In no case was constipation the primary cause of complaint; there was, as a rule, a daily movement of the bowels, but it was doubtless deficient in quantity and probably the passage time through the bowel was lengthened. In such children the brownish discoloration of the skin of the abdomen and axillæ is often a guide to the presence of relative constipation and there is ample evidence that many children, even without grave colonic defects, "hoard," that is to say, in spite of daily and regular movement, the bowel is never properly cleared. A mild aperient will often induce the passage of enormous stools covered with inspissated mucus.

(*b*) Of the primary complaints, one was of general ill-health and suppression of sweat, one was of recurrent attacks of fever, two of diarrhœa and one of restlessness at night.

(*c*) In all cases there was definite clinical evidence of dilatation of the colon. *X*-rays were employed rather as a confirmation than as a means of diagnosis and in order to estimate the degree of dilatation and obstruction.

(*d*) The patients improved under treatment. An *x*-ray photograph of case 1, taken two years after the inception of treatment, showed a distinct lessening of the distortion. Two, cases 1 and 3, were reported as constitutionally well five years later. It is possible that with the increase in size of the abdominal cavity the colon finds proportionately more room.

(*e*) In those cases, numbers 1 and 2, in which there was definite anal obstruction, the first steps to recovery were rapid, but at the stage at which they came under treatment secondary obstruction had developed and a complete anatomical, as opposed to functional, recovery is doubtful.

In this connection, the following case, one of extreme spasm of the anus, is illuminating. The patient, a breast-fed female baby, aged four months, is reported to cry almost continuously and to show signs of grave discomfort after meals. There is obstinate constipation. The face has a pinched, anxious expression and is slightly blue round the mouth. The abdomen is in a state of urgent distension.

The little finger was with difficulty passed through the anal sphincter and met with a ring-like constriction of mucous membrane similar to that in case 2. The result of this manœuvre was dramatic, the withdrawal of the finger was followed by the passage of a vast liquid stool and the child's face forthwith lost that expression of acute anxiety. Treatment was started at the end of May, for the first few days by the passage twice daily of the finger, the rectal injection of olive oil and gentle massage, and later, when the abdominal distension was sufficiently reduced to render it

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prudent or possible, by daily saline bowel washes. When abdominal distension was to some degree reduced, peristalsis of the colon was visible and it was seen that the abdomen was distinctly fuller on the left side. By the end of July, rectal irrigations were unnecessary, the child usually passed motions without help, but the occasional passage of the finger was necessary. The child at this time was well and putting on weight regularly. Throughout the treatment, no form of purgative was given.

Such cases, though in milder degree, are by no means uncommon; in the writer's experience the condition is more common in female babies, and it is conceivable that, untreated, they may progress to that degree of distortion seen in the cases noted above.

The *x*-ray photographs from which the diagrams were prepared were taken by Lieut.-Col. J. A. Shorten, I.M.S. (retd.), and Dr. G. Galstaun.

PELLAGRA IN THE DECCAN.

A REPORT ON 40 CASES OCCURRING AMONG LEPERS AT THE LEPROSY HOSPITAL, DICHPALI, HYDERABAD, DECCAN.

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Introductory.

PELLAGRA is a disease which has been recognised and described for many years in Europe, America and other countries. During the Great War there were several outbreaks in prisoners' and refugees' camps and much interest was aroused in the subject. Since then many cases have been reported in different parts of the world, and much work has been done on its ætiology; but the exact cause of pellagra is still unknown.

Cases have from time to time been recorded in India, but there have not been sufficient data for a study of the prevalence of pellagra in India, and it is doubtful if some of the cases reported really were pellagra. It is hoped that the publication of the present article will stimulate the study of this disease in India.

Personal observations.

The condition was first observed in the Leprosy Hospital, Dichpali, Hyderabad, about six years ago when a few cases were seen and one or two deaths were recorded. Since then the condition has been seen with increasing frequency until the present year when about twenty cases have come under observation. Altogether during the last few years about forty cases have been seen and about ten deaths have occurred.

Seasonal occurrence.

The disease has a marked relation to season. It appears about December and increases in frequency till March when the frequency decreases and most cases have either died or cleared up by May. Recurrent attacks are sometimes seen one or two years later in the same season of the year as the original attack.

Age and sex incidence.

During 1931, 20 patients have so far come under observation, 11 females and 9 males. Since the number of females in this institution is roughly only one-quarter the number of males, the incidence rate has been more than four times greater in women than in men. This may possibly be explained by diet (*vide infra*), as the women get a smaller ration than the men. The youngest patient was 14 years old and the oldest 40, the remainder being distributed fairly evenly between these two ages.

Conditions associated with the onset.

In most cases the disease has arisen while the patient was under treatment here for leprosy. About six cases have arisen in people before admission. All the cases seen have been lepers, but as this is a leprosy hospital this fact is not surprising. We consider, however, that the abnormally high incidence of this disease among lepers here may have some connection with their leprosy or with the conditions of life in this institution. The diet of the patients is discussed later.

Clinical manifestations.

(*a*) *General.*—At the beginning there is little general disturbance. The patients may show general malaise and loss of appetite and there may be a slight evening rise of temperature but usually the skin lesions have appeared without constitutional disturbance, and in cases with skin lesions only (these form 50 per cent. of our cases) the patient is able to walk about and do light work with no distress. When lesions of the mucous membranes appear, there is much constitutional disturbance. There is gradually increasing weakness as the lesions of the skin, mucous membranes and nervous system develop. The disease from start to finish is, however, practically afebrile in most cases, though an evening temperature of 99 to 100 is sometimes reported.

(*b*) *Lesions of the skin.*—Erythematous areas of skin, often of a coppery colour, gradually appear. In dark-skinned people the erythema is not marked, and it is rapidly followed by a black ichthyotic condition. The epidermis becomes very dry and black, it cracks and later peels off sometimes leaving raw areas.

The distribution of the skin lesions is very striking. The lesions are usually, but not always, symmetrical and are seen on those areas most exposed to sunlight, with the exception of the face which is usually little affected. The areas most affected are in order of frequency:—

1. The radial border and the back of the forearm and hand.

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2. The dorsum of the foot and the anterior part of the lower leg.
3. The neck and occipital region of the head.
4. The extensor aspect of the thigh.

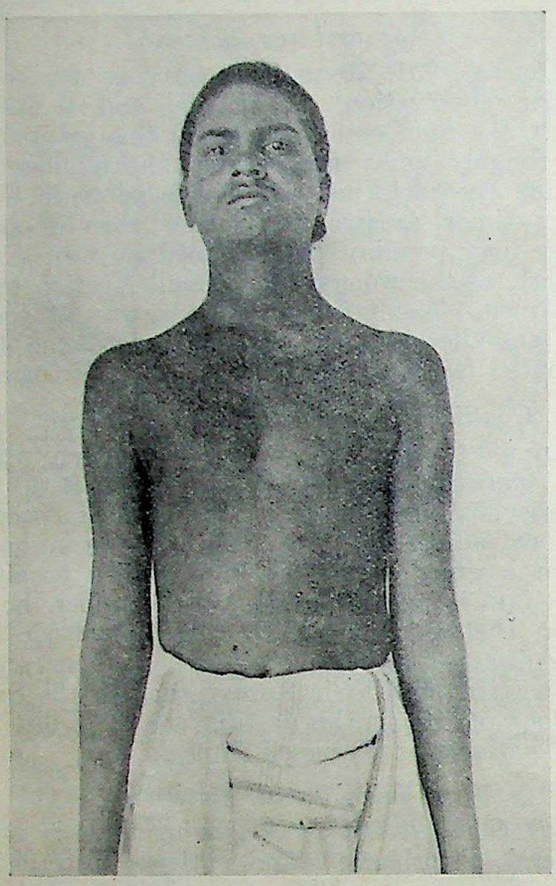

Fig. 1.—Dermatitis of upper part of chest, outer aspect of upper arms, radial border of forearms.

5. Genitalia.
6. Nose and adjacent skin on both sides.
7. Skin around the mouth.
8. Upper part of the chest and back.
9. Extensor surface of the upper arm.

The patches on the arm and hand have been seen in every case and are most characteristic. They are confined to the radial border and the back of the forearm and hand and have very definite margins. The patches on the neck, though seen less commonly, are very striking. They appear first at the sides of the neck and spread forwards and backwards, fading off into normal skin at the front but at the back showing round radiating margins. The patches are seen on both sides of the neck, they approach each other gradually and finally coalesce, thus covering the whole of the back of the neck. The patch then spreads upwards over the occipital region with no definite upper border, but with a definite dark line like a collar running round the base of the neck and forming the lower margin of the patch. Another striking lesion seen, however even less commonly, is the "butterfly patch" on the nose and over the malar bones. The skin of the genitalia, when affected, peels off leaving raw areas and there is much suffering from pruritus. These are the typical skin lesions. In the other areas mentioned above the rough black skin is seen, but the lesions have less definite borders and a more irregular distribution.

In cases that recover the black skin peels off leaving depigmented areas into which the pigment gradually returns and the skin finally becomes normal in appearance.

(*c*) *Lesions of the mouth and fauces.*—In about 50 per cent. of cases either with, or shortly after, the appearance of skin lesions, lesions of the mouth appear. Soreness of the tongue, the gums and the pharynx is common. Excessive salivation is a marked feature and I have seen a patient fill a pint mug with saliva in a few minutes. The tongue gradually becomes more red and inflamed and in severe cases is completely denuded of epithelium and looks like raw beef. There is often ulceration at the sides of the tongue. The mucous membranes of the fauces, palate, pharynx and nose may be affected and swallowing and breathing may be painful. The mucous membrane of the lips and the skin round the mouth becomes black and cracked and the patient's condition is very pitiful.

(*d*) *Intestinal symptoms.*—Various writers have emphasised the frequency of intestinal symptoms in pellagra but in the present series of cases, except in the severer forms, these have not been marked. Some cases have shown no intestinal disturbance, some have shown constipation, some diarrhœa, and some have

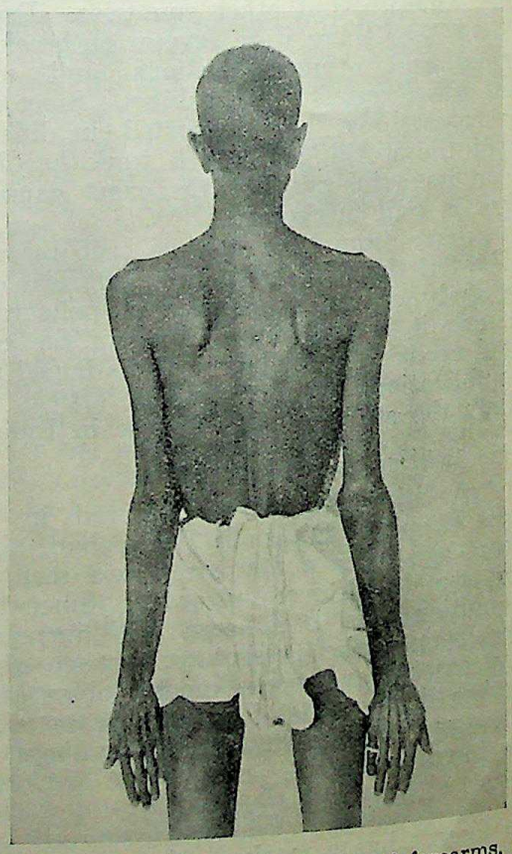

Fig. 2.—Dermatitis of radial border of forearms, backs of hands and neck.

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complained of colic and gaseous distension of the abdomen. Most of the fatal cases have had a terminal diarrhœa with pale, pasty stools.

(*e*) *Nervous and mental symptoms.*—Those have not been a marked clinical feature in this series of cases. The slighter cases with only the skin affected have shown no nervous or mental changes, but in those cases developing lesions of the mucous membranes, nervous and mental symptoms have been present to a varying extent. Several patients have complained of a burning sensation in the limbs, and some of cramp-like pains. A few patients showed tremor of the tongue. One patient showed marked weakness of the muscles of the leg, a gait similar to that of tabes, absent knee jerks, and attacks of severe abdominal pain.

The mental symptoms were seen in only a small proportion of cases and took the form of depression, melancholia, restlessness, and sleeplessness, but in three cases the mental symptoms have been more marked. One case showed marked melancholia with periods of mania and suicidal tendency. Another case became semi-comatose and had periodic attacks of an epileptiform nature. A third case showed extreme depression and melancholia and finally committed suicide by drowning.

(*f*) *Cardiac symptoms.*—Several of the severe cases have shown evidence of myocarditis. There has been dilatation of the heart, a rapid pulse, sometimes irregular, œdema of the feet, and dyspnœa. Heart failure has been the cause of death in most of the fatal cases.

(*g*) *Termination.*—In each year by the end of May, all cases have either died or recovered. Of 40 cases seen, 20 have suffered from skin symptoms only and have cleared up, 20 have developed mouth symptoms, and of these ten have recovered and ten have died. The development of mental symptoms, if at all marked, has always been followed by death, but in several of the fatal cases mental symptoms have not been marked. Death is usually sudden, apparently from heart failure. The patient may not appear worse, and may actually appear to be improving when sudden collapse occurs, sometimes after an effort to sit up.

(*h*) *Recurrent attacks.*—Of the 30 patients who have recovered from the first attack some have left the institution and have not remained under observation. Of those who remained under observation six have had recurrent attacks, some in the next year and some two years later. Recurrent attacks appear to be of increased severity.

Diagnosis.

The forty cases seen have in the writer's opinion all been the same disease, pellagra, differing in form and severity. The typical dermatitis has been seen in every case. In about half the cases clinical lesions of the gastro-intestinal tract have been seen and in only about a quarter of the cases have mental and nervous symptoms been at all marked; but as pointed out by Goldberger (1916, 1920, 1926) diarrhœa is not always, and not even usually, present while dementia occurs only in late cases. This is certainly true of the present series of cases. The clinical features described and the seasonal occurrence seem to make the diagnosis of pellagra unavoidable. Since pellagra has rarely been described in India, and never to the writer's knowledge in Hyderabad State, this diagnosis was only made after careful investigation and consultation with other medical men.

Diet.

The diet of the patients affected has been investigated with some care. Most of the people are poor and have to depend for their food entirely on the rations given in this institution. The institution is a mission institution with limited funds and the dieting is done by each patient for himself; each patient is given half a *seer* (1 lb.) of unmilled rice each day, one *chapati* made from *jawari* flour with salt and a little *ghee*, one anna with which to buy sundries from the institution shop and firewood with which to cook his food. In addition, when available from the institution gardens, vegetables are issued, but only in small amounts and for limited periods. The one anna a day is spent in buying *dhal*, meat, fish or vegetables when available. In the hot weather vegetables are almost unobtainable. This diet is poor but is probably better than that obtained by most of the patients in their homes.

The following are typical diets:—

Case No. 2.—Early morning, *jawari* bread and *dhal*, midday, rice and *dhal*, evening, rice and *dhal*. Does not eat meat or fish. Takes vegetables when available (October to December). During last year he had only 3 or 4 meals of maize (roasted ears).

Case No. 6.—Early morning, *jawari* bread and *dhal*, midday, rice, *dhal* and tamarind, night, meat (beef) and rice. Has meat once or twice a week, vegetables two or three times a week from October to December and once or twice a month in the hot weather. Has fish occasionally. During the past year has eaten about 5 meals of maize.

Case No. 8.—Early morning, *jawari* bread, rice and *dhal*. Midday, rice and *dhal*, night, rice and *dhal*. Has meat once a week, vegetables very rarely, fish once a month and never takes maize as it is not grown in her village and she is quite unused to taking it.

Case No. 10.—Early morning, rice, tamarind, and *jawari* bread, midday, rice and tamarind, night, rice and meat (beef). Has meat twice a week, vegetables twice or three times a week, October to December, and about once a month in the hot weather. Has fish about once a month. Takes *dhal* most days. During the

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past year has had only one meal of maize consisting of 5 ears.

Case No. 12.—Early morning *jawari* bread, rice and tamarind. Midday, rice and tamarind. Night, rice and meat (beef). Has meat only once a week, *dhal* once a week, vegetables rarely, does not eat fish. During last year has had only two or three meals of roasted ears of maize.

These diets are typical of those of the pellagra cases seen here. Attempts were made to find out whether the diet of the pellagra cases differed from that of the patients who have not developed pellagra, but no marked differences were found. To get at the exact diet taken was not easy. Some patients seem to spend the whole of their small money allowance, and others seem to try to save some of it. Probably the pellagra patients were among the latter class but this cannot be said to have been very clearly demonstrated. The average diet seems to consist of rice 1 lb., *jawari* 4 ozs., curds 1 oz., and either *dhal* or meat or fish 3 or 4 ozs.; a little *ghee* is smeared on the bread made from the *jawari*, and a little *ghee* and vegetable oil mixed is used in cooking curry. With the curry is taken some flavouring of practically no food value.

Diet values.

The caloric value works out at from 2,300 to 2,700 calories a day. Our people are of small build and low weight and they do not do heavy work but even so this caloric value is insufficient.

The diet gives roughly the following as the value of the different constituents:—

Protein.	Carbohydrate.	Fat.
2.7 ozs.	17 ozs.	0.75 oz.

The protein and fat are markedly deficient, the protein is of poor value and the carbohydrate is in excess. Mineral salts are also probably deficient. McCarrison says of diets in South India "They are deficient in at least three dietary factors. All contain protein of relatively poor quality, all contain too little mineral elements, especially calcium, sodium and chlorine, and all are deficient in fat soluble vitamin A." This is true of the diet of our patients here.

Treatment.

These cases have been treated on dietetic lines. They have been given milk, meat, fruit, and vegetables and the last few cases have had yeast. Arsenic and tonics have been given and the rest of the treatment has been symptomatic. It cannot be said that the treatment has proved itself from the data available to be of great value. Mild cases recover without any treatment, though they may recur. Severe cases die in spite of treatment. The value of treatment may be demonstrated in the future by a diminution in the number of relapses. The treatment by yeast which is said to have a marked effect has only been used among our patients recently and the cases were already recovering before it was started. None of the cases that died have been treated by yeast.

Ætiology of pellagra.

The ætiology of the disease is obscure, and the more the subject is investigated the more obscure it seems to become. There are three main schools of thought on the subject of the causation of pellagra. It is impossible within the space available to do justice to all these schools and here we must be content to summarise the theories as far as possible.

(*a*) *The protein deficiency theory.*—It is contended that protein deficiency is the cause of pellagra and that this deficiency may be caused in several ways. According to Wilson (1921) these are:—

1. Absolute deficiency of intake below normal requirements.
2. Deficiency relative to individual energy requirements.
3. Deficiency due to low availability of protein resulting from the nature of the food.
4. Secondary deficiency due to bacterial destruction of protein in the intestine or to defective powers of digestion or assimilation.

The supporters of this theory claim that in pellagra there is always one or more of these factors at work, and they produce a mass of clinical observations to support this theory. The disease has been produced in man and apparently in animals by giving a diet markedly deficient in protein. The disease can be prevented and treated by the administration in large amounts of protein of high biological value. If this theory is the true explanation, it is remarkable that pellagra is not commonly seen in south India where the diet is notoriously deficient in protein.

(*b*) *The vitamine deficiency theory.*—The protagonists of this theory contend that it is not the lack of protein that causes pellagra, but that it is the lack of a certain principle called the P. P. (pellagra preventing) factor which is commonly present in certain foods of high protein value. Once more a mass of experimental and clinical evidence is brought forward to support this view. It is found that some proteins although of high biological value may not prevent pellagra while other proteins do. It is considered that there is a pellagra preventing (P. P.) factor present in the latter group which is absent in the former. This is of the nature of a vitamin and is probably identical with the growth-promoting moiety of vitamin B. Fresh beef and yeast are found to be rich in the P. P. factor. The principal exponent of this view is Goldberger (1916, 1920, 1926).

(*c*) *The infection or toxin theory.*—This theory contends that pellagra is caused by an infection, either of the gastro-intestinal tract or else of food, particularly maize, producing

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a toxin which affects metabolism by its action on the endocrine glands. Marrett isolated a bacillus from the intestinal mucosa of pellagrins and also cultivated a similar bacillus from maize obtained from areas where pellagra was endemic. The bacillus is said to be allied to *B. welchii*. Some workers have suggested a blood-borne infection. Attempts to transmit the disease to healthy volunteers by getting them to ingest pellagra material or by the injection of the blood of pellagra patients have not been successful. Attendants on pellagra cases are said rarely, if ever, to develop pellagra, but it is interesting to note that one of the present series of cases developed after the patient, a woman, had been nursing a severe case of pellagra which terminated fatally.

None of these theories explains all the facts. Most workers agree that diet is very intimately connected with pellagra. The deficiency school explains the connection between maize and pellagra by the fact that maize proteins are of poor biological value or defective in the P. P. factor, as the case may be. But cases of pellagra are reported in patients who have never eaten maize, and also in patients in whose diet there seems to have been no protein deficiency, and no deficiency of the P. P. factor, if such a substance exists. Some authorities consider that pellagra is not one disease but is a syndrome which can be produced by a variety of causes acting singly or in combination. If all the clinical and experimental evidence produced is based on really scientific observation it seems that this latter conclusion is forced upon one.

Lack of protein and vitamin or the P. P. factor may predispose to infection or lower the resistance to food toxins, and infection and toxins may prevent the absorption or assimilation of protein, so a vicious circle may be set up. Even in pellagra patients with a very low protein intake, excess of indican is often found in the urine. Wilson (1921) has pointed out that this indican must be derived from the tryptophane in the diet, so that at least one amino-acid grouping, although deficient in the diet, is being assimilated very little if at all.

In considering the ætiology of the present series of cases there are several points of interest. The protein intake of these patients has undoubtedly been low and the protein has not been of high biological value. The diet has been poor in those foods which are said to contain the P. P. factor. Maize has been taken in very small amounts only, and as a rule two or three months before the first signs of pellagra. One patient affirms that he never ate maize, and I believe his statement is true. Theoretically it is possible that the taking of maize in small quantities at long intervals may be sufficient to produce pellagra, if the maize is infected, but the maize-theory exponents do not seem to adopt this position. It is the regular eating of infected maize that is blamed for the production of pellagra.

One fact which may be of interest is that in this institution about 12 months ago a regular issue of 4 ozs. of bread made from *jawari* flour was begun. Pellagra had been seen here before, but during the last year it has been much more common. This is possibly a mere coincidence but it deserves further consideration. *Jawari* is a kind of millet; its composition is given as protein 10.4 per cent., carbohydrate 71.2 per cent., fat 3.9 per cent., mineral matter 2.2 per cent. and water 12.3 per cent. Its use has been encouraged in this institution because of its comparatively high protein content and its low cost. The possibility of there being any connection between *jawari* and pellagra is probably discounted by the fact that about 30 of our patients, being Mahrattas, do not eat rice, their staple diet being *jawari*, and no case of pellagra has occurred among them. The incidence of pellagra has been higher among rice eaters, in whom the protein element in the diet has been most deficient. These facts seem to favour the deficiency theory rather than the infection theory, but in these cases the possibility of infection cannot be completely ruled out.

Let us look at the facts from a different angle. Here is a series of cases of pellagra breaking out in an area where pellagra is either unknown or so rare as to be unrecognised, and breaking out among people whose diet is certainly deficient in certain respects but almost certainly not more deficient than it is among the general population in these parts. What may these factors be? A local endemic infection may be a factor, but there is little evidence either for or against this hypothesis. The fact that the cases have all been patients in a leprosy hospital, suggests that leprosy may bring about some change in their metabolism and thus render them more liable than others to develop pellagra. R. M. Wilson (1925) has reported an outbreak of pellagra in a leprosy institution in Korea, a country where pellagra is either unknown or very rare.

The writer feels unable to express any definite opinion on the cause of this outbreak of pellagra. Certain facts point to diet deficiency as the cause, other facts point to an infective agent. Either of these causes may have been enabled to act more powerfully by a derangement of metabolism produced by leprous infection, but leprosy is not a disease which in its early stages produces much general metabolic disturbance and several of these cases of pellagra had very little leprosy.

The work of Georges Mouriquand (1926) on dieto-toxins may have an important bearing on the ætiology of pellagra. He finds that certain substances, alimentary or otherwise, without toxicity under normal dietetic conditions, reveal their latent toxicity when the diet becomes deficient or ill-balanced.

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Is "pellagra" one disease?

A survey of the literature on pellagra brings out the fact that the cases described as pellagra show marked differences in their clinical manifestations. For instance, in the cases occurring in the prisoners' camps during the war, œdema of the feet was usually the first sign. In many other outbreaks this sign is not mentioned. In some cases pellagra seems to have been diagnosed on the basis of either mental changes or intestinal disturbance alone, dermatitis being absent. In many other cases, the present series for example, intestinal and mental disturbances were usually absent and dermatitis was the only constant feature. Some writers describe pellagra as nearly always recurring annually and producing death in a few years. Other writers describe pellagra as not showing a marked tendency to recurrence.

The differences may be due to the one disease showing itself in forms that vary with climatic, racial and other factors, but it may be that under the name of pellagra there has been described more than one disease allied in its clinical manifestations but possibly differing in its cause. Possibly some of the confusion and the difference of opinion existing among workers on the subject of pellagra is due to the fact that they are not all talking about the same condition.

TYPICAL CASES.

1. *Severe form showing dermatitis, glossitis, nervous and mental symptoms, and ending fatally.*

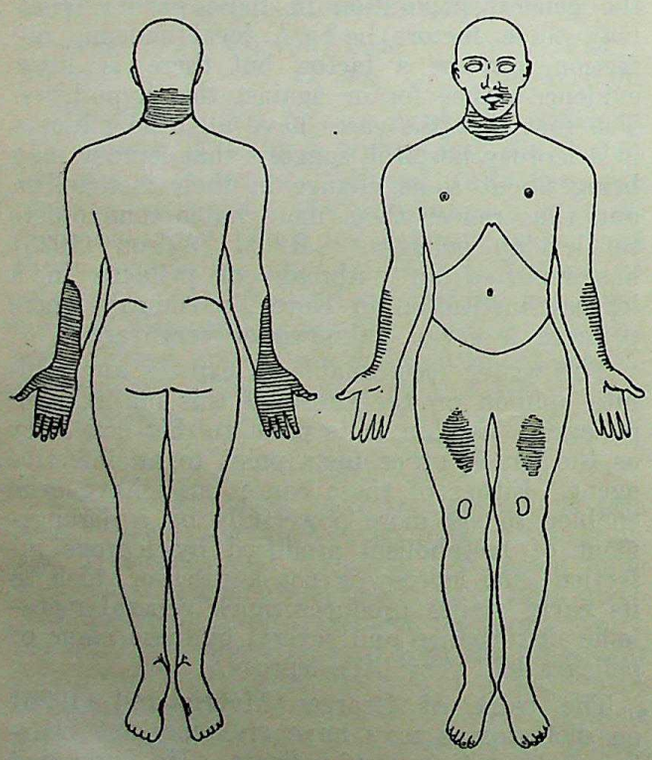

Fig. 1.

S. R., male, aged 35, a convict from the Central Jail, Hyderabad. On admission showed slight nerve leprosy and in addition the following signs:—Weakness of legs, tabetic gait, absent knee jerks, and black dermatitis of neck, arms and legs (see figure 1). He had sudden attacks of abdominal pain. The Kahn test was 4 plus. He was diagnosed and treated as suffering from tabes, but soon developed glossitis, salivation, great weakness and later mental symptoms, great restlessness and depression, attacks of acute mania and later dementia sometimes with seizures of an epileptiform nature with muscular rigidity and clonic spasms. Swallowing became very difficult, and there was paralysis of the bladder with retention and overflow of urine. Later there was complete coma ending in death. The whole course took two months. The case presented several interesting points in diagnosis. The tabetic signs and the Kahn test suggested tabes but the dermatitis, glossitis and salivation and the subsequent course of the disease all point to pellagra as the correct diagnosis.

2. *Severe recurrent form showing dermatitis, glossitis, etc., and terminal mental and gastro-intestinal symptoms.*

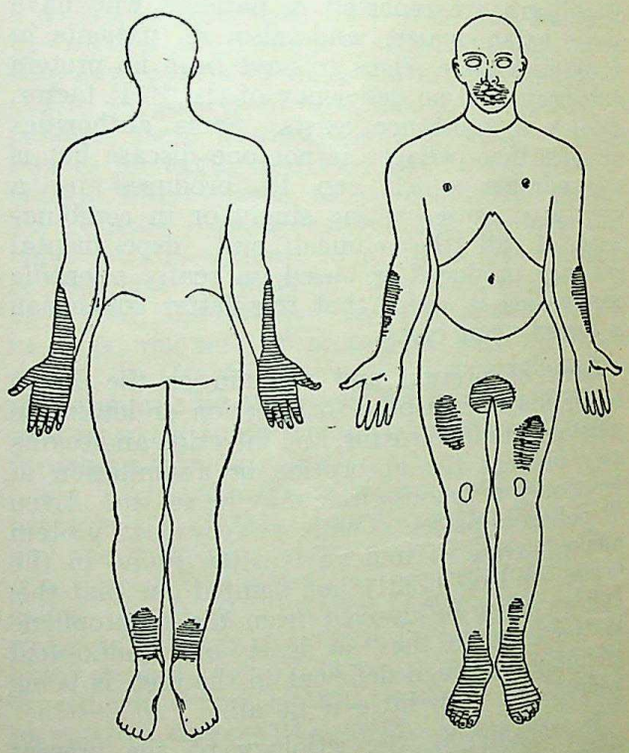

Fig. 2.

S. L., female, aged 40, moderately severe skin leprosy. In January 1930, had dermatitis and slight glossitis, but cleared up. In January 1931, developed dermatitis (see figure 2), glossitis, pharyngitis, and had burning sensation all over the body. There was great weakness and marked depression and a terminal diarrhœa with pasty stools. After one month's increasing weakness the patient became comatose and died.

3. *Extensive dermatitis without gastro-intestinal, mental, or general symptoms followed by recovery.*

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B. J., male, aged 18, well built and strong and having very slight signs of leprosy, developed in January 1931 extensive dermatitis (see figure 3). There were no other symptoms

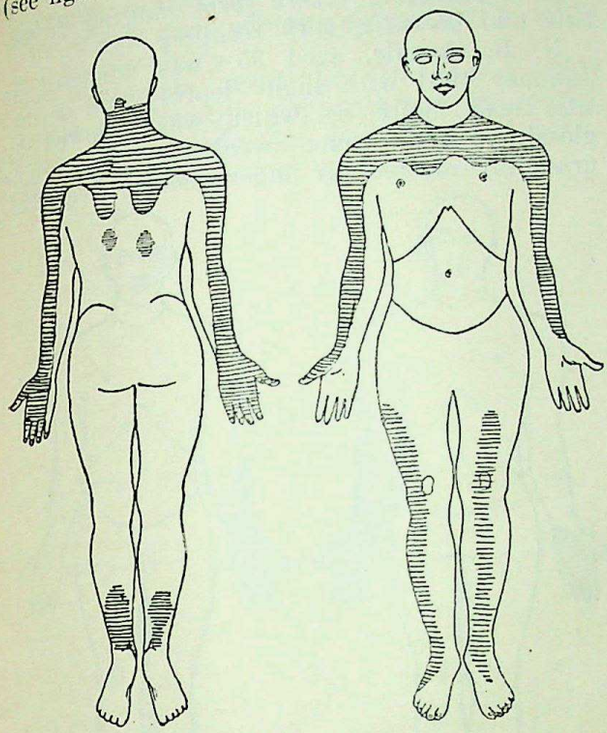

Fig. 3.

and the disease cleared up under general treatment in two months. The nature of the dermatitis, a coppery erythema followed by blackness, cracks and desquamation, and its distribution and occurrence at the pellagra season make the diagnosis of pellagra certain.

4. *Severe recurrent form showing dermatitis, glossitis, etc., gastro-intestinal symptoms, and some mental symptoms, terminating in suicide by drowning.*

S. M., male, aged 16, of poor physique with moderately severe leprosy, developed in January 1929 some patches of dermatitis on the arm and legs, and some glossitis, etc. These cleared up in April 1929; in 1930 he remained clear but in January 1931 after an attack of malaria he developed dermatitis (see figure 4), glossitis, pharyngitis, œsophagitis and inflammation of the nasal mucous membrane. The tongue was completely raw, salivation was tremendous and breathing and swallowing were very painful. There was abdominal distension with much flatulence, constipation, sleeplessness and restlessness, marked weakness and depression. The skin of the genitalia peeled off leaving raw areas with much pruritus. The patient's condition was most pitiful. He was so weak that he could hardly sit up in bed, but one night he succeeded in dragging himself about 200 yards to a well and throwing himself in and he died from suicide by drowning. The frequency of suicide in pellagra is commented upon by some authors.

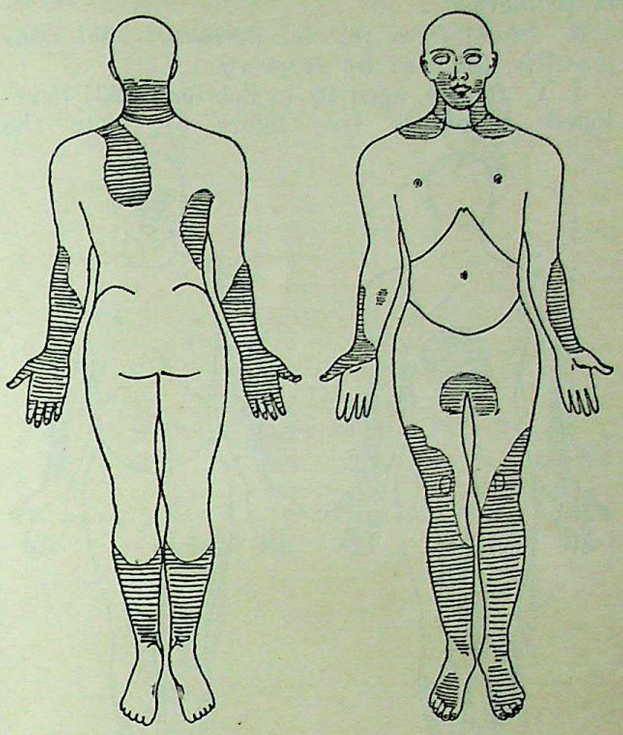

Fig. 4.

5. *Severe form showing dermatitis, glossitis, etc., followed by recovery.*

K. Y., male, aged 30, in December 1926 developed dermatitis (see figure 5), marked glossitis

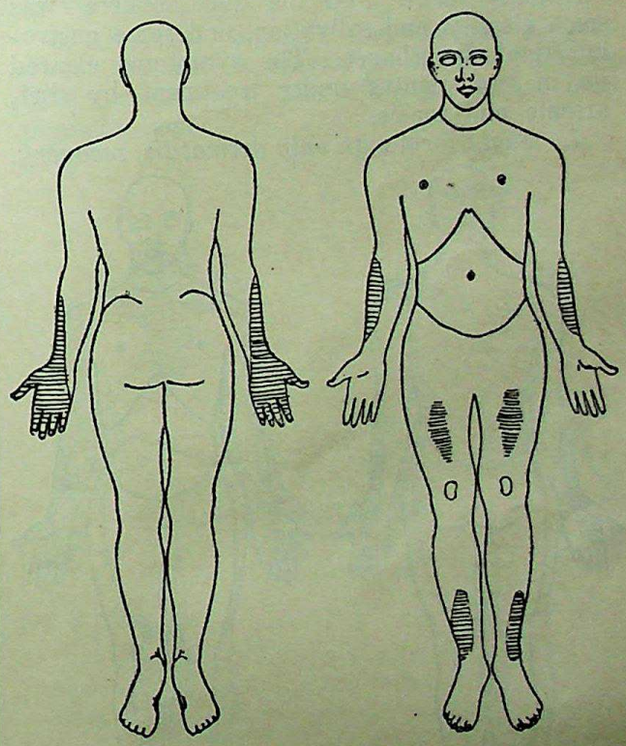

Fig. 5.

and salivation, and pharyngitis. There was great weakness and wasting continuing for 3 months and then gradual recovery, the dermatitis finally clearing up in May 1927. Since

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then there has been no recurrence and in April 1931 the patient was seen and showed no signs of pellagra.

6. *Slight form showing dermatitis and some glossitis, followed by recovery.*

J. Y., female, aged 16, in February 1931 developed dermatitis (see figure 6); note the

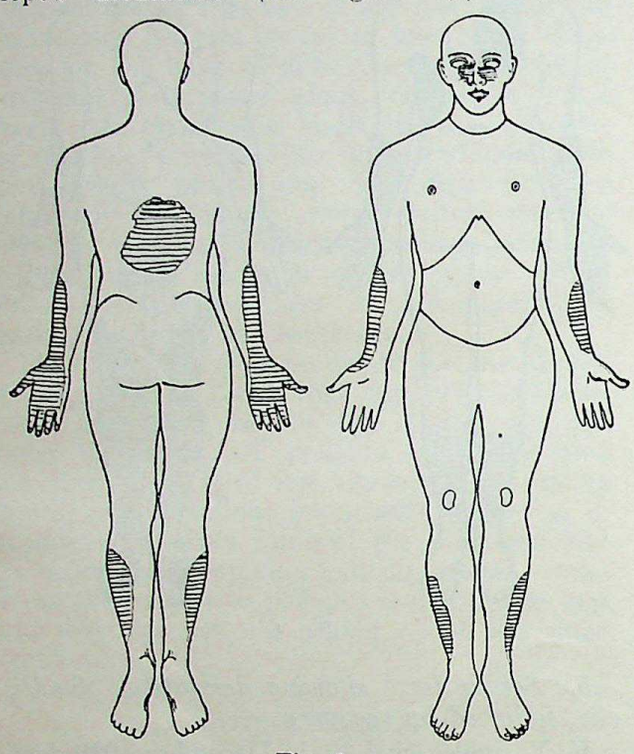

Fig. 6.

"butterfly patch" on the face. There was some glossitis and salivation, and some gastro-intestinal disturbance. The symptoms cleared up in two months under treatment by diet, arsenic and tonics.

7. *Slight form with only dermatitis, recovery.*

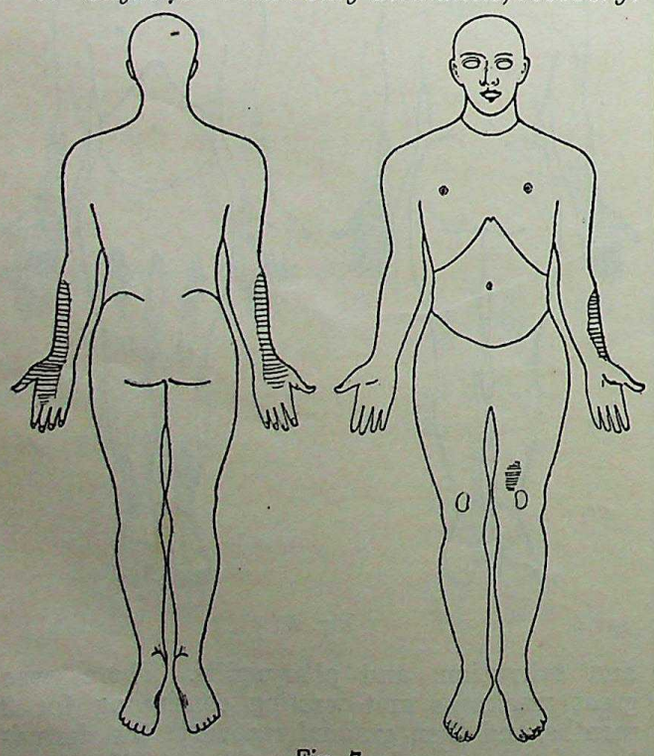

Fig. 7.

G., male, aged 16; in April 1931 dermatitis appeared (see figure 7). There were no other symptoms. Dermatitis cleared up in six weeks.

8. *Moderately severe form showing dermatitis and glossitis, with recovery.*

N. B., female, aged 35, was admitted in January 1931 with slight leprosy and dermatitis (see figure 8) which was followed by glossitis, and some weakness. The signs gradually cleared up under general treatment.

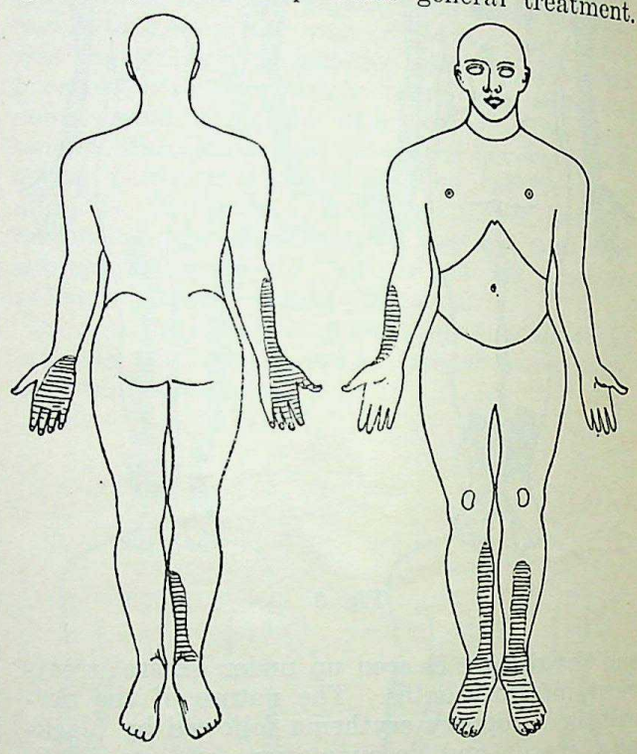

Fig. 8.

9. *Slight form showing only dermatitis—recovery.*

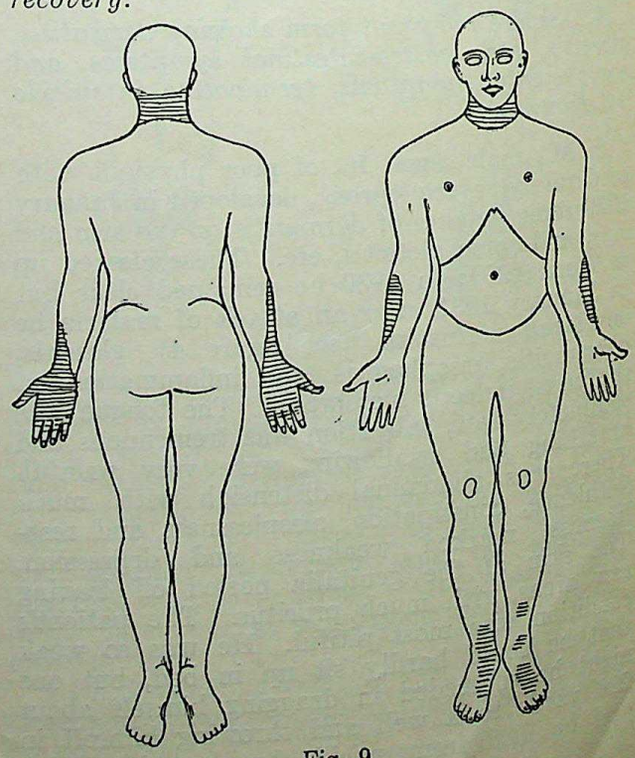

Fig. 9.

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M. I., male, aged 60, with chronic nerve leprosy, admitted in January 1931, typical pellagra dermatitis (see figure 9). There were no other symptoms or signs; the condition gradually cleared up.

10. *Slight form showing dermatitis, glossitis, etc., with recovery.*

T. P., female, aged 16. In March 1931 patches of dermatitis appeared (see figure 10). There was some glossitis, salivation and weakness. The signs cleared up in two months.

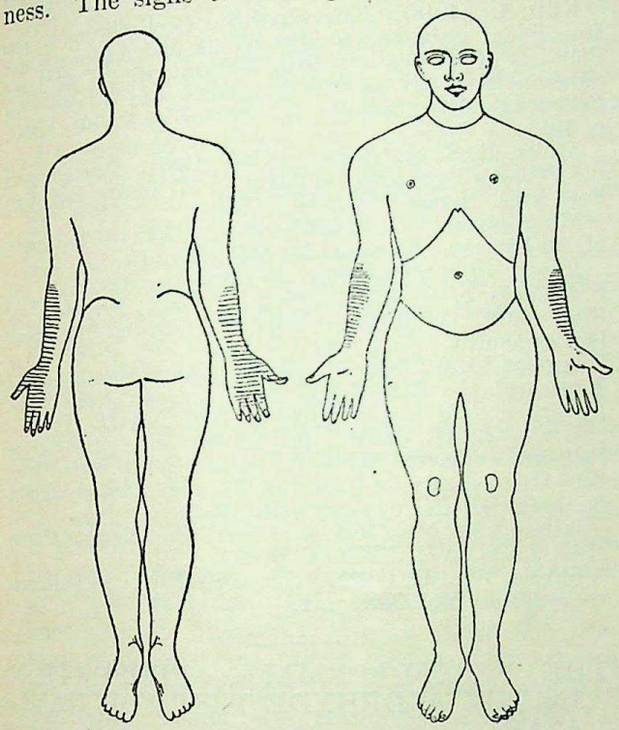

Fig. 10.

11. *Slight form showing only dermatitis, with recovery.*

P. B., male, aged 14. In February 1931 dermatitis appeared on neck, arms and legs (see figure 11). The appearance and distribution were very typical of pellagra, but there were no other symptoms. Cleared up in two months.

12. *Moderately severe form showing dermatitis, glossitis, etc., with recovery.*

B. P., male, aged 23, says patches of dermatitis appeared first in September 1930 (see figure 12). In February 1931 there was glossitis, salivation and weakness. Signs cleared up very slowly and in May 1931 dermatitis was still present, but slight.

Morbid anatomy of pellagra.

No post-mortem or pathological examinations were made in the present series of cases. The following is a summary of the morbid anatomy as described in the literature of pellagra.

1. *General.*—There is marked atrophy and wasting of all organs and tissues.

2. *Gastro-intestinal tract.*—The changes described are a brownish-red coloration of the buccal and œsophageal mucous membranes sometimes with areas of necrosis, marked wasting and atrophy of the muscular layers and the mucosa of the small and large

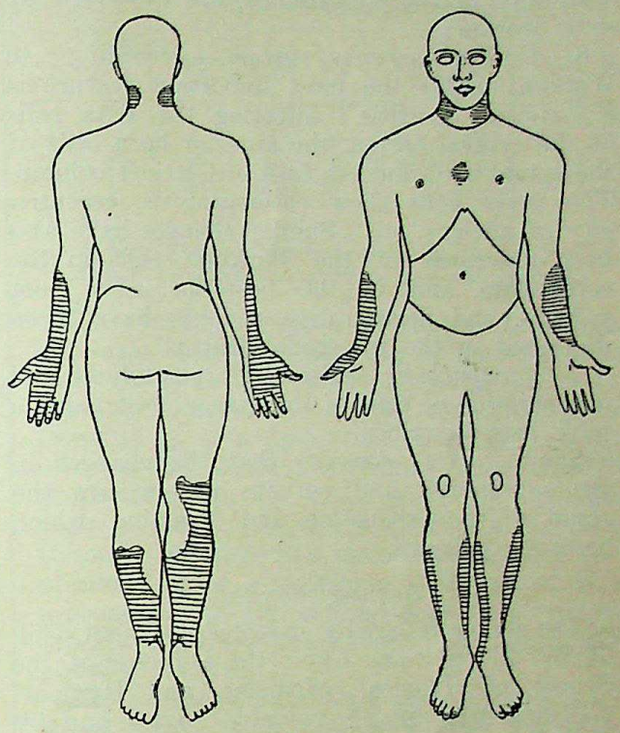

Fig. 11.

intestines. The mucosa is often congested and inflamed and ulceration is sometimes present in the colon.

3. *Internal organs.*—The internal organs show chronic degenerative changes, usually fatty degeneration, and often a peculiar deep pigmentation.

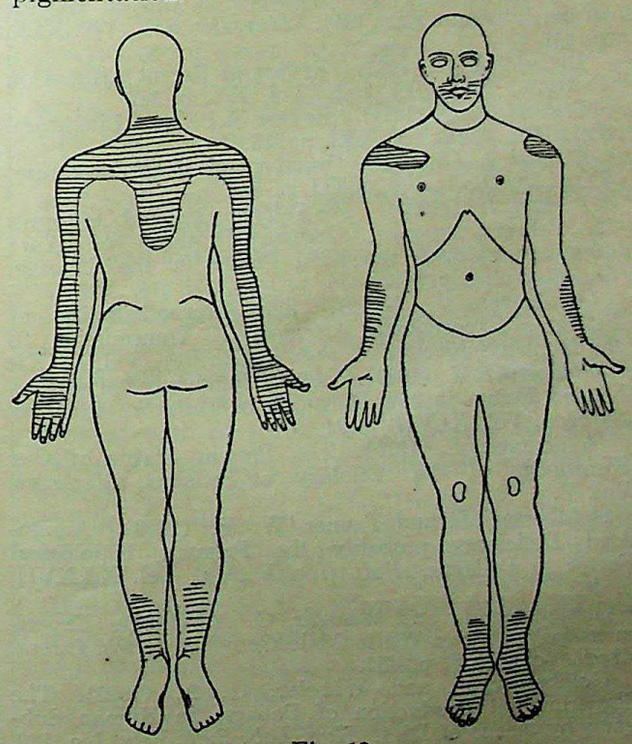

Fig. 12.

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4. *The heart.*—Myocarditis and "brown atrophy" are described.

5. *Endocrine glands.*—Certain degenerative changes, fibrosis, atrophy, degeneration of cells, especially in the suprarenals, are described by some workers.

6. *Central nervous system.*—According to Watson (1925) the most important feature is a "central neuritis" affecting the Betz cells of the central cortex, the anterior horn cells of the spinal cord and the cells of Clarke's column. The nerve cells show chromatolysis, eccentricity of nucleus, etc. Similar changes have also been described in the Purkinje cells in the cerebellum, and in the posterior nerve root ganglia, and degenerative changes have been described in the pyramidal tracts.

7. *Sympathetic system.*—Chromatolysis and degeneration of cells of the sympathetic ganglia have been described.

Some workers consider that the changes in the suprarenals and nervous system are the result of the exhaustion and wasting which occurs in pellagra.

Acknowledgment.

The writer is greatly indebted to Lieut.-Col. H. W. Acton, C.I.E., I.M.S., the Director of the School of Tropical Medicine and Hygiene, Calcutta, who by his valuable advice and by providing extracts from the literature on pellagra has made the preparation of this paper possible.

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THE SERUM-FORMALIN PROPORTION IN THE ALDEHYDE TEST FOR KALA-AZAR.

By C. R. DAS GUPTA, M.B. (Cal.),

Assistant, Kala-azar Enquiry, Indian Research Fund Association.

(*From the School of Tropical Medicine, Calcutta.*)

A NUMBER of serum tests for the diagnosis of kala-azar have been described from time to time, namely, the globulin precipitation test (Brahmachari, 1917), the hæmolytic test (Ray, 1921), the aldehyde test (Napier, 1921, 1922 and 1923) and the antimony test (Chopra, Gupta and David, 1927), but of all these the writer has found the last two the most reliable, and for practical purposes he prefers the aldehyde test as it never gives a false positive result if the criteria of its originator are strictly observed; also in all rough and field work the aldehyde test has the advantage of extreme simplicity. Simple though the test is, nevertheless in the procedure of properly mixing a definite quantity of serum with a definite quantity of formalin and in reading the results of the test the rules laid down by its originator should be strictly followed. Violation of these rules has led to many a fallacious result being obtained with this very simple test, even by people with some amount of laboratory experience. Frequently we have received

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samples of blood said to have given a strongly positive aldehyde reaction which in our hands have given either absolutely negative or only doubtful results. Also we have been told by some that within a short period the same serum gives different results —sometimes positive and sometimes doubtful or negative. In all these cases when information was sought as to the procedure followed in doing the test the answer has invariably been that, "a *little* formalin was added to a *little* serum."

In order to ascertain how these anomalous results have been obtained the writer carried out a few experiments varying the proportion of serum and formalin. Tests were carried out with the serum of 56 kala-azar patients from the kala-azar out-patient department of the Calcutta School of Tropical Medicine; these can be divided into three groups, kala-azar cases with a strongly positive aldehyde reaction, non-kala-azar cases in which there was a doubtful or negative aldehyde reaction, and kala-azar cases with a negative or doubtful aldehyde reaction diagnosed by parasitological means. The experiments were carried out with the following mixtures of serum and formalin: —2:1, 1:1, 1:2, 1:3, 1:4, 1:5, and 1:6. (Preliminary experiments with serum-formalin mixtures of 8:1, 6:1, 4:1 and 3:1 were found to give identical results with the standard aldehyde test so that these dilutions were subsequently omitted.) In all cases the readings recorded were taken within half an hour of adding the formalin to the serum; not after 24 hours, as in the standard aldehyde test. In some instances 2 sets of readings were taken, one within half an hour and the other after 24 hours, but the difference between the two readings was found to be negligible.

TABLE I.

Kala-azar cases with positive aldehyde reaction.

	A.R.	Serum-formalin mixtures.							
		3:1	2:1	1:1	1:2	1:3	1:4	1:5*	1:6
+	10	10	2	3	9	10	10	1	2
±	—	—	5	4	1	—	—	6	6
—	—	—	3	3	—	—	—	1	2

A. R. = Standard aldehyde reaction.
* In two instances this mixture was not included.

When there were 3 parts or more of serum to one of formalin the reaction was positive, as in the standard test, but when the serum-formalin proportion fell to 2:1 only 2 out of 10 were positive. After this, with the increase in the proportion of formalin there was an increase in the number of positive reactions until a proportion of 1:5 was reached when there was again a falling off.

TABLE II.

Non-kala-azar cases with negative or doubtful aldehyde reaction.

	A.R.	Serum-formalin mixtures.						
		2:1	1:1	1:2	1:3	1:4	1:5*	1:6
+	—	—	1	9	31	37	31	27
±	24	3	3	9	10	4	4	13
—	17	38	37	23	—	—	—	1

A. R. = Standard aldehyde reaction.
* In 6 instances this mixture was not included.

The above table shows an analysis of 41 non-kala-azar cases with negative or doubtful aldehyde reaction. It will be seen that when the amount of serum was greater than that of the formalin up to a proportion of 2:1 not a single false positive result was obtained, and when the proportion was 1:1 there was only one false positive result. As the proportion of serum to formalin fell more and more false positives were obtained up to a maximum of 37 out of 41 at a proportion of 1:4, and in the last two mixtures 1:5 and 1:6 there was a slight falling off in false positive results.

Let us consider tables I and II together. It is apparent that, provided the proportion of serum to formalin is not less than 3 to 1, no false results will be obtained; that is to say the test retains its specificity. False negatives are found with a serum-formalin mixture of 2 to 1, but it is not until the serum and formalin are equal that any false positives will be obtained. When the serum-formalin mixture is 1 to 4 a positive result is obtained in practically all sera; that is to say the specificity of the test is entirely lost. As one would expect, when the proportion of serum to formalin is still further lowered, the coagulable substance—which is in the serum—is still further diluted and positive results become fewer. It is, however, rather interesting that it is among the kala-azar sera that the percentage of positive results declines more rapidly.

It seems possible that the coagulation phenomenon on which the aldehyde test depends is associated with the globulin fraction in the serum, and that the coagulation which occurs when the formalin is in great excess is associated with the albumin fraction; in an advanced case of untreated kala-azar there is an excess of globulin and a marked deficiency of albumin.

The results with the few aldehyde-negative sera from kala-azar patients approximate more closely to those of the non-kala-azar cases than to those of the advanced kala-azar cases in most of the mixtures, but it will be noted that with the serum-formalin dilutions of 1 to 6 the results were closer to those of the advanced kala-azar cases; with only five cases in this group it is impossible to attach any

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significance to this fact, until further observations have been made.

TABLE III.

Kala-azar cases with doubtful or negative aldehyde reaction.

	A. R.	Serum-formalin mixtures.						
		2:1	1:1	1:2	1:3	1:4	1:5	1:6
+	—	—	—	—	3	5	4	1
±	3	—	—	3	1	—	1	4
—	2	5	5	2	1	—	—	—

A. R. = Standard aldehyde reaction.

Conclusion.—It will be seen that very diverse results are obtained by indiscriminate mixing of serum and formalin; these may or may not be in accordance with the results of the standard test. Hence in order to get the best possible result, the rule laid down by its originator, namely, of putting a drop of 30 per cent. formalin into 1 c.cm. of clear* serum in a small test tube and then intimately mixing it by gently shaking, should be strictly adhered to. Although in this series when the serum-formalin mixture was 3:1, or more, the results obtained were almost identical with those of the standard aldehyde test, we do not recommend any departure from the originally-advocated proportions, because we are of opinion that this ratio of the reagent—and the ratio is after all the most important factor in all precipitation tests—is optimal.

The end result, which depends entirely on whether there is complete opacity, partial opacity (*i.e.*, clouding or opalescence), or no change at the end of 24 hours, should be noted and the results recorded as positive, doubtful or negative, accordingly, though in the case of a strongly positive reaction complete opacity will occur and the result can be read in about half an hour. It must be clearly understood that gel formation, which is popularly spoken of as solidification, is only an associated factor and when present by itself is mostly of negative value in the diagnosis of kala-azar.

My grateful thanks are due to Dr. L. E. Napier, for his most valuable guidance in doing these tests and for his help in preparing this paper. The paper is published with the kind permission of the Secretary of the Indian Research Fund Association.

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* Difficulty is said to be encountered sometimes in getting clear serum from the blood. But this can be very easily surmounted by washing out the syringe with normal saline just before taking the blood.

A Mirror of Hospital Practice.

A CASE OF HABITUAL FORMATION OF STONE IN THE BLADDER.

By GOPAL R. TAMBE, M.A., B.SC., L.M. & S., K.I.H.,

Chief Medical Officer, Cutch.

A. R., aged 22 years, a resident of Jadura, a village in the Bhuj district of Cutch State, was operated on at Rajkot about 2½ years ago for a large stone in the bladder; this was his first operation. Suprapubic lithotomy was performed and the stone was about the size of a duck's egg, according to the description of the patient. He was discharged, cured, from the hospital. There were no complications; the suprapubic wound had completely healed and there was no fistula. Within three months of his return home, he felt the usual symptoms and experienced the same trouble in passing urine as before the operation. One day he noticed a minute hole in the scar-line of the suprapubic area, through which a few drops of urine trickled. This minute opening went on widening in course of time until in about a year's time it became very wide and most of the urine sprang out in a stream like a fountain; this happened most markedly when he lay flat on his back. He then sought admission in the Jubilee Hospital at Bhuj on the 6th of September 1929. On sounding *per urethram* which would admit a no. 14 catheter easily, as well as through the suprapubic fistula, the stony contents could be easily and distinctly felt. The patient was prepared for litholapaxy which is my operation of choice in such cases. As the patient had been operated on only 12 months previously it was presumed that the present calculus must be a new formation. It was hoped, therefore, that it would be of small size and easy to crush. Unfortunately it turned out otherwise. Not only was the calculus large, it was too big for any lithotrite that I could pass in up to no. 14; I had therefore to have recourse to suprapubic lithotomy. On opening the bladder and delivering the calculus it was found to be a big conglomeration of five component stones all massed together. The patient made an uneventful recovery.

On the 6th of April 1931, the same patient sought admission to the Jubilee Hospital again with symptoms of stone in the bladder. The presence of stone was confirmed on sounding and on the 13th instant he was operated on and the stone was removed. It weighed 2 drams and 45 grains. It was soft like its predecessors and it was composed of pure phosphates.

My object in reporting this case is to show the tendency of the patient's bladder to form stones at a fairly quick rate, which is rather unusual. I have no doubt that many workers in the field of urology must have met similar cases in their practice. It would be interesting to know their views on the causes of such rapid and frequent formation of calculi in the same subject.

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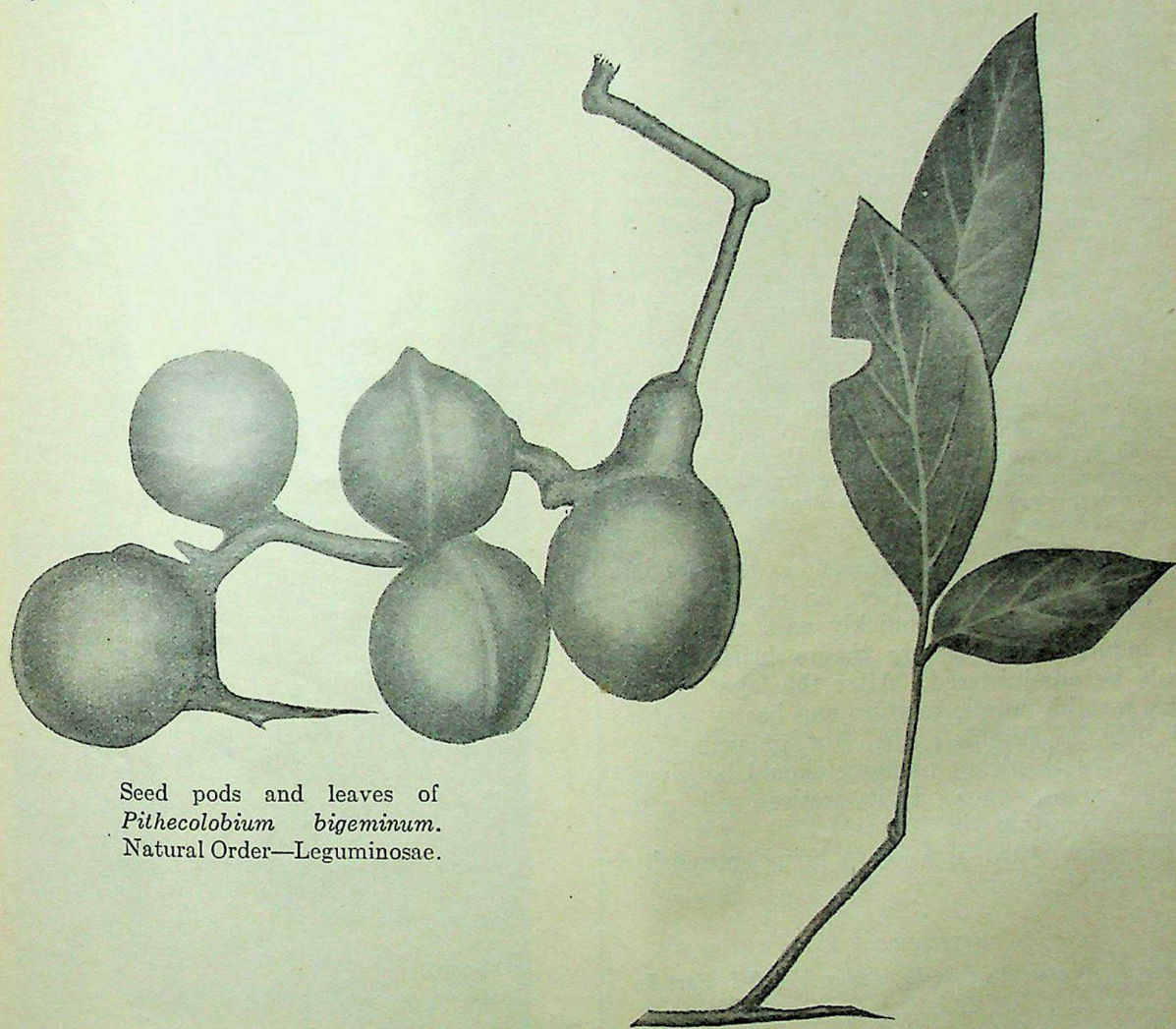
A NOTE ON THE TOXIC SYMPTOMS PRODUCED BY EATING THE SEEDS OF *PITHECOLOBIUM BIGEMINUM*.

By E. J. CREAIS, L.M.S.S.A. (Lond.),
LIEUTENANT, I.M.D.,
Civil Surgeon, Mergui, Burma.

Pithecolobium bigeminum, a large tree of the order Leguminosae, is found in tropical forests in India, Burma, Ceylon, Malaya and the Philippines.

The Hindi name for the tree is *Kachlora*, and in Burma it is known as the *Ta-nyen-thi*, *Da-nyin-thi* and sometimes as *Dhayin-thi*.



Seed pods and leaves of *Pithecolobium bigeminum*. Natural Order—Leguminosae.

The seeds are as large as, and in their general appearance resemble, chestnuts. The taste is agreeable, and is said to be like that of almonds having a high content of oil.

These seeds are in great demand in Burma, and the Burmese and Karens are extremely fond of them. The method of preparation is as follows:—The nut is shelled out of its dried pericarp and boiled, the water is drained and fresh cold water added; this in turn is boiled and drained. It is usual to boil the seeds three times. The nut is eaten after being dipped in oil and salt, or it is added to *ngapi* (preserved fish). In Tennasserim it is sun-dried, pickled in boiling brine, and used as a condiment with *ngapi*.

A laxative action of the bowels follows the ingestion of the seeds, with expulsion of much flatus. The breath and urine are rendered offensive.

Medicinal uses.—A decoction of the leaves applied externally is used in upper India as a nostrum for leprosy, and for promoting the growth of hair. The seeds are prescribed by Burmese *Se-Sayas* in the treatment of diabetes mellitus.

Toxic symptoms.—Sometimes alarming symptoms follow the ingestion of *Danyin-thi* seeds, and I have seen many such cases of poisoning in the Thayetmyo and Sandoway districts of Burma. These symptoms are likely to occur in particular amongst persons who, at the time, are suffering from constipation. Vomiting is usual, with abdominal pain resembling colic. If the uncooked seeds are eaten, violent and persistent vomiting may prevent further symptoms from developing.

The urine is suppressed, and there is severe pain over the loins and over the bladder.

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Strangury occurs with the passage of a few drops of urine, which is often blood-tinged. Later when the flow of urine recurs there may be free hæmaturia.

In addition there is headache and giddiness. Vision is blurred and objects looked at appear to be oscillating, and the conjunctivæ are suffused. Muscles are cramped, particularly in the extremities, and the severity of the symptoms, which set in quickly, gives the patient a sensation of impending death.

I have reason to believe that poisoning from the seeds of *Pithecolobium* causes death of the unborn child.

Case 1.—M. E. M., a Burmese female, aged 28, 6 months pregnant, greedily ate about a dozen *Danyin-thi* seeds which had been boiled once only. She had vomiting, suppression of urine, strangury, and cramps. She was brought into hospital, and gradually recovered. Frequent auscultation failed to elicit fœtal heart sounds, nor could fœtal movements be felt. The patient volunteered the information, during her convalescence, that fœtal movements (which previously had been very vigorous) had now entirely ceased. I was unable to follow up the case.

Case 2.—M. T. M., a Burmese female, 35 years of age, bought 10 seeds for two pice from a hawker of these nuts. Two hours after eating them she was unable to move on account of cramps in her thighs and legs. Vision was blurred, and a bracket lamp appeared to her as though it was swinging. Her eyes were red, and there was giddiness and headache. She had intolerable pain over the region of the kidneys, and urine was completely suppressed. Under treatment she was considerably better in the morning. Urine was passed in small quantities but strangury persisted for over 24 hours.

Treatment.—This is entirely symptomatic. If vomiting has not occurred, an emetic is indicated. Morphia will quickly ease the pains and induce sleep. Before this a brisk purge should be administered. After the lapse of 12 hours, a mild diuretic mixture and barley water will help to stimulate the flow of urine. A light diet with plenty of fluids should be given during convalescence. Diaphoretics will also assist in excreting the toxins.

I have not heard of a death being caused by *Pithecolobium* seeds.

REFERENCE.

Watt's *Economic Products of India*, Vol. VI, Part I.

GUINEA-WORM IN A BOY AGED 2.

By M. G. RAMACHANDRA RAO, M.B., C.M.,

Chief Medical and Sanitary Officer, Maharaja's Hospital, Pudukotah.

A BOY, aged 2, was brought to the out-patient department from a village 15 miles off for the treatment of a swelling in the left groin.

The position of the swelling (see photograph), the way in which the boy was being carried, and the fact that he was crying loudly, suggested at first sight a diagnosis of strangulated hernia.

History.—On its first appearance eight months ago the swelling was the size of a small marble; it gradually increased to its present size. The swelling was painless and did not subside in spite of various quack applications.

On closer examination, I found that the swelling was firm, smooth, painless, and cyst-like, about the size of a hen's egg and movable apart from the testis. The inguinal canal and the external ring were normal; there were no adhesions to surrounding structures, and both testes and cords were normal.

Before operation.

Differential diagnosis.—We have to distinguish between strangulated hernia, bubo, abscess, lipoma, and hydrocoele of the cord.

(1) It is not a strangulated hernia for reasons already mentioned. (2) It is not a bubo, as it is slightly below the groin and has not the feeling of a gland. (3) It is not an abscess, as there is no fluctuation and no pain. (4) It is not a hydrocoele of the cord, as the swelling can be easily moved away from the cord and the cord can be felt separately. (5) Therefore a provisional diagnosis of lipoma was made and the patient was operated on under chloroform.

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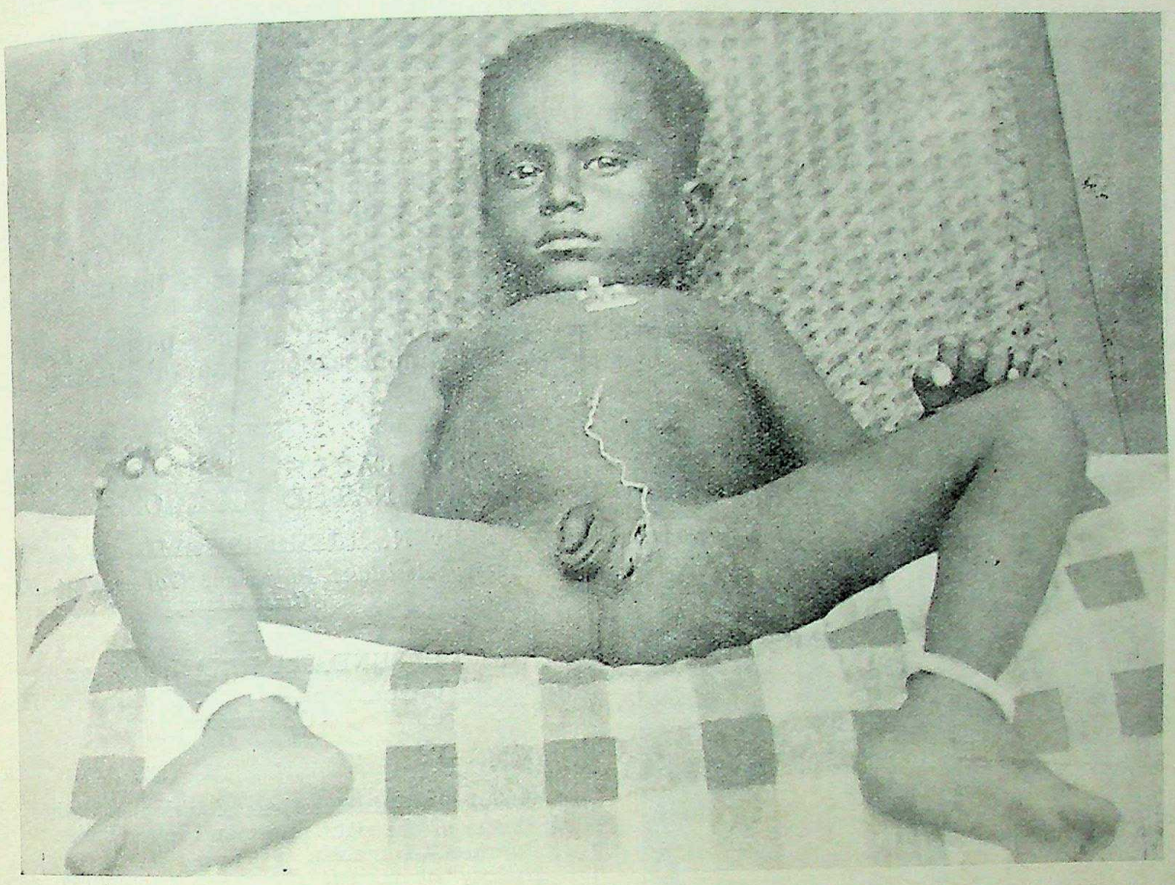
To my surprise and to the surprise of my assistants I found an abscess cavity with a coiled-up guinea-worm about 10 inches in length. In the second photograph the worm is seen still attached to the deep tissues.

After three days it was completely discharged and the boy was taken away before the wound completely healed up.



During the operation: the worm is still attached to the deep tissues.

I have seen another similar case in which the worm was hanging 6 inches from the preputial opening.

A CASE OF MYELOID LEUKÆMIA.

By J. N. GHOSAL, L.M.S.,
Basirhat.

G. N. R., aged 48, carrying on business as a betel-nut seller, had been suffering from an irregular type of fever with intermissions, a very big spleen reaching 8 inches below the costal arch, a moderately enlarged liver, and dyspnœa out of proportion to the anæmia present. As the blood was repeatedly negative to Napier's test, and as he had been drugged with quinine without any impression being made on his fever or spleen, a blood count was done. To our surprise, a splendid picture of myeloid leukæmia was observed:—

Hæmoglobin	60 per cent.
Red blood corpuscles ..	2,440,000 per c.mm.
White blood corpuscles ..	360,000 per c.mm.
Differential count—	
Polynuclears	55 per cent.
Lymphocytes	23 per cent.
Large mononuclears ..	2 per cent.
Eosinophiles	3 per cent.
Basophiles	1 per cent.
Abnormal cells—	
Myelocytes:	
Eosinophilic ..	5 per cent.
Neutrophilic ..	11 per cent.
Nucleated red blood corpuscles	a few.
Polychromatophilia ..	present.

On account of frequent epistaxis (hæmorrhages are common in myeloid leukæmia), a course of Collo-Calcium was given, whole blood was injected intramuscularly once a week, and iron and arsenic prescribed. The patient showed no marked improvement, although occasional remissions occurred, and he ultimately succumbed, after suffering for fully two years, with general anasarca and exhaustion.

Comments.—The writer met with another similar case about 15 years ago in which the proportion of red blood cells to white blood cells was 6 to 1. This patient also was more than 40 years of age and died within one year. These cases are rare and they are seldom diagnosed in the mofussil.

The writer's attention was drawn to the first-mentioned case from the disproportionate amount of dyspnœa manifested on movement.

(In our experience this condition is much more common in Bengal than in London, for example, nearly every month one such case is encountered in the kala-azar out-patient department of the School of Tropical Medicine. —Editor, *I. M. G.*).

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A CASE OF RAYNAUD'S DISEASE.

By SARASI LAL SARKAR,
Civil Surgeon, Noakhali,
and
ASSISTANT SURGEON HARISH CHANDRA SEN.

S. B., a Mahommedan female, aged 20, residing at Bhola, District Barisal, was admitted into the Female Hospital, Noakhali, on 6th February, 1931.

History.—About 2½ months before admission, the patient had an attack of fever, remittent in nature, lasting for one week. On the first day of the attack she felt severe pain in the fingers of her left hand; this was so severe as to cause insomnia. During the period her left hand, especially the fingers, became red and swollen. Then the swelling subsided gradually, but about 7 days after the onset of the pain the tips of all the fingers of the left hand became ulcerated and the pain continued. After about a month the ulcers on the tips of the first two fingers healed, but those in the other three fingers, *i.e.*, in the middle, ring and little fingers, extended towards the proximal side and gradually the affected parts of the finger became black and dry with loss of sensation in these parts.

The patient was of a neurotic disposition. Nothing is noteworthy regarding the family history. Neither albumen nor sugar was found in the urine. There was no definite history of exposure to damp.

The condition of the patient on admission.—There is pain in the proximal part of the inner three fingers and slight pain in the outer two fingers on pressure.

The distal phalanges of the inner three fingers have dried up and turned black. There is loss of sensation in the dried-up parts of the fingers. The outer two fingers, which were ulcerated at the tip, are found to have healed up with superficial scar tissue. There is no loss of sensation in these two fingers.

No abnormality of the nervous system was found on examination.

Subsequent progress.—Antiseptic dressings were applied regularly every day. On February 7th the distal phalanges of the little finger completely separated and fell off. On the next day the line of demarcation between the gangrenous and the healthy portions of the two other fingers became sharply defined. The ring and middle fingers dropped off on February 14th and 24th, respectively; after this the wounds healed gradually and the patient was discharged on March 6th. During the first two days the temperature rose to 99.6°F., but subsequently it was normal.

Remarks.—The disease ran a peculiar and sharp course. The amputation of the portions of the fingers can be explained by the local syncope which is an expression of constrictor influences, causing spasm of the arteries and arterioles, so that not a drop of blood enters the part, causing not only necrosis of the soft tissues, but also of the phalanges in the affected areas, so that these dropped off as though amputated.

Hence we have diagnosed the case as one of Raynaud's disease.

The photograph of the patient shows the gradual amputation of the middle finger.

A VERY EARLY CASE OF DISSEMINATED SCLEROSIS.

By N. KRISHNASWAMI, L.M. & S.,
Honorary Assistant Physician, Government Hospital, Coimbatore,
and
R. SUNDARA RAJAN, M.B., B.S.,
Honorary Ophthalmic Assistant, Government Hospital, Coimbatore.

Name.—P.

Age.—12 years.

Complaint.—Absolute loss of vision in both eyes and weakness of the right upper and lower limbs.

Duration.—1 month.

History of present illness.—Nine months ago the patient had an acute attack of fever which lasted for about 4 days. The vision began to fail gradually in both eyes from that time onwards. For the last month there has been absolute failure of vision in both eyes. For the last two months the patient has had a feeling of heaviness and stiffness in both upper and lower right limbs.

Previous history.—The patient has not suffered from any other illness prior to the commencement of the present complaint.

Family history.—The patient is the first living child of her mother; three older children died 7 or 8 days after birth.

Physical signs and condition on examination.—Fairly well-nourished individual. Age about 12 years. Not anæmic. Teeth clean. No pyorrhœa. Tongue badly coated.

Cardiovascular system.—Normal.

Respiratory system.—Normal.

Abdomen. (a) *Alimentary canal.*—Appetite rather poor. Bowels very irregular. No tumour or fluid in the abdomen.

(b) *Liver.*—No pain in the right hypochondrium. No jaundice. No tenderness on pressure in the right hypochondrium. Liver not palpable.

(c) *Spleen.*—Not palpable.

Urinary system.—Nothing abnormal found in the urine. No enlargement or pain in the region of the kidney. The patient complains of transient attacks of frequency of micturition.

Nervous system. Memory and intelligence.—Normal.

Sleep.—Normal.

Sometimes the patient has neuralgic pains all over the lower extremities during the night.

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Muscle power.—Normal. Increased tone in muscles, but now and then, as the patient walks, the lower limbs give way and she falls down.

Coordination of movement.—Normal.

Gait.—Slightly spastic.

Tendon jerks.—All the tendon jerks are exaggerated.

Superficial reflex.—Abdominal reflex completely lost.

Babinski's sign.—Positive (Plantar response—extensor).

Sensation of touch, pain, temperature, and position.—Normal.

Cranial nerves.—All the cranial nerves excepting the optic nerve are normal.

Vision.—*Nil* in both eyes.

Pupils.—Unequal and dilated. Do not react to light. Movement of eyes normal.

Fundi.—Primary optic atrophy of both eyes. Pale white discs. Vessels well marked. Pigment deposits in the periphery of the left fundus and a few vitreous opacities in that eye.

Other observations.—Movements of the face and tongue normal. No intention tremor. Speech appears to be quite normal at present. Nystagmus cannot be elicited since the patient is blind and cannot follow the instructions clearly.

Diagnosis.—The prominent symptoms in this case are:—

1. Gradual diminution of visual acuity.
2. Optic atrophy as revealed by examination of the fundi. The whole disc is pale.
3. Weakness of the limbs.
4. Presence of signs of pyramidal involvement.
5. Complete absence of any sensory loss.

This is a case in which there is a combination of spastic weakness in the limbs, optic atrophy, and signs of pyramidal involvement. Further, these have followed an acute febrile condition. So we have no hesitation in diagnosing this as a case of early disseminated sclerosis. According to James Collier, certain cases of disseminated sclerosis have defective vision only as their first symptom. He also states that optic atrophy in a young person is in itself suggestive of disseminated sclerosis. "As a rule some sign, such as loss of abdominal reflexes, Babinski's response, or intention tremor will be found to indicate the cause of the eye trouble."

Differential diagnosis.

(1) *Hysteria.*—This can be eliminated on account of—

(*i*) optic atrophy,
(*ii*) loss of abdominal reflexes,
(*iii*) age of the patient.

(2) *Compression of the cord.*—This can be eliminated since there is no sensory loss.

(3) *Friedreich's ataxy.*—This can be eliminated at once since the tendon reflexes in the present case are exaggerated whereas they are lost in Friedreich's disease.

Note.—This is the earliest age at which disseminated sclerosis has been reported. The lowest age mentioned in the literature is 16 years.

A CASE OF CHRONIC MIKULICZ'S DISEASE OF THE RIGHT LACHRYMAL SAC.

By P. K. KURUP, L.C.P.S. (Bom.),
Medical Officer, Taliparamba (Malabar).

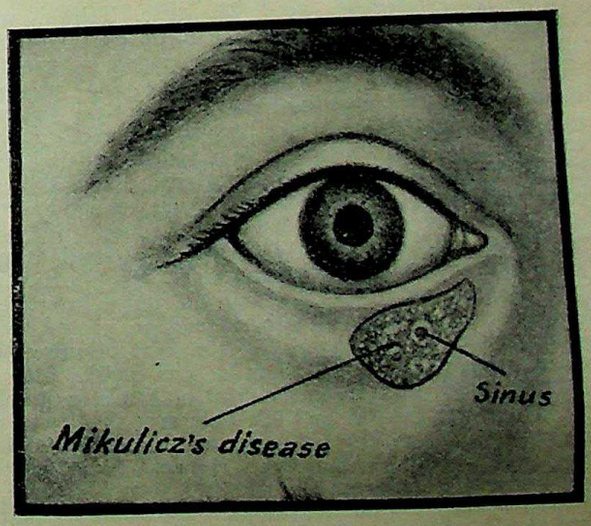
A FEMALE, aged 65, of the Adidravida caste, came to me on 14th March, 1931, with an ulcerating swelling of the right lachrymal sac. The surface of the growth was granular and devoid of skin, and the centre of the granular area exhibited a small sinus through which thin purulent material escaped. The left lachrymal sac was not affected. The duration of the disease was two years. As I was on the lookout for a rhinosporidial affection of the lachrymal sac, the specimen, after operation, was sent to the Professor of Protozoology of the Calcutta School of Tropical Medicine where the growth was identified as "Mikulicz's tumour." The report on the section of the growth was as follows:—

"A granuloma full of polymorphonuclear leucocytes with Mikulicz's cells on a hyaline background; long columns of endothelial cells forming new blood vessels are also seen."

Mikulicz's tumours are usually bilateral and occur in the lachrymal and parotid glands, but in this case only the right lachrymal sac was found affected. The parotid glands were not affected. These tumours are generally symmetrical and occur in the salivary glands also. Sometimes there is enormous swelling of each lachrymal sac, and of the parotid and submaxillary glands while the sublingual glands and the small salivary glands in the cheek are also swollen, the whole producing a striking alteration in the physiognomy of the patient. The disease occurs as acute and chronic types. In the acute type there may be fever.

The acute condition requires fomentation locally and salicylates of soda internally. The chronic type is supposed by many to be a manifestation of leucæmia or pseudoleucæmia, or it may be tuberculous; treatment will have to be modified to suit the condition.

The case under report is one of the chronic type; the anterior wall of the sac as well as the skin over it gave way producing a granular appearance in the area, (*vide* figure).



Treatment.—Excision of the growth was performed and the area dressed antiseptically,

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dusting of the area with boric acid was carried out and the condition healed nicely within 8 days. The technique of the operation was similar to that done in suppurative dacryocystitis.

Mikulicz's disease is rare; in this case it is unilateral and not symmetrical.

TWO PNEUMONIA CASES WITH A RARE MODE OF ONSET.

By RASAMAY BHATTACHARYYA, L.M.P.,
Bokpara T. E. Hospital, P. O. Doom Dooma (Upper Assam).

THE onset of pneumonia with gastro-intestinal symptoms is probably not a very common thing. Textbooks of medicine are remarkably silent on this point. Osler and McCrae have mentioned that gastro-intestinal disturbances, vomiting and pain in the abdomen, may be the prodromal symptoms in some cases; these symptoms may precede or replace the initial chill. In fact, in my experience, though I have had occasion to deal with many pneumonia cases, I have noticed the peculiar onset with vomiting and diarrhœa in two only. The following is a brief summary of these cases:—

Case 1.—J. Ch. B., aged 2½ years, caste, Sowra, was admitted into the hospital at 9 a.m. on 26th May, 1930, in a collapsed condition with profuse diarrhœa and vomiting. Thinking it to be a case of choleraic diarrhœa which is not uncommon here, a hypodermic injection of atropin and digitalin, gr. 1/400 āā was given immediately. Rogers' saline—half a pint with sodium bicarbonate ʒi was then given subcutaneously. Santonine gr. 1½ with calomel gr. ½ and sodium bicarbonate gr. v. was administered orally. At 12 noon the temperature rose from subnormal to 101°F., and the pulse became perceptible; this I took as evidence of reaction. At 3 p.m. he passed urine. At 4 p.m. the temperature rose up to 103.2°F., the pulse was regular and of fair tension but I noticed a slight cough and hurried respiration which aroused my suspicion. I examined the lungs and found crepitations at the bases on both the sides at the back. Next day other signs of pneumonia developed. Subsequently the patient was treated as pneumonia and discharged cured on 17th June, 1930.

Case 2.—J., female, aged 23, caste, Telegu, was admitted into the hospital at 5 p.m. on 6th February, 1931, in a semi-collapsed condition caused by profuse vomiting and purging. Coughing was also present. Remembering the preceding case, I did not fail to examine the lungs immediately but no abnormality was revealed. A hypodermic injection of atropin and digitalin, gr. 1/100 āā was immediately given. Bacteriophage (combined cholera and dysentery), one ampoule, was administered orally, preceded by a dose of sodii bicarbonas. Rogers' saline 1½ pints with sodii bicarbonas ʒiii, was given subcutaneously. By 8 p.m. the temperature rose to 99.4°F., and the pulse improved. At 9 p.m. santonin gr. iii with calomel gr. iii and sodii bicarbonas gr. x was given. By the next morning the patient passed urine and the pulse was regular and of moderate tension. One teaspoonful of Eno's fruit salts was given. On the 8th and 9th February there was no rise of temperature, the pulse was good and the patient appeared to be all right in every respect, except for the persistence of coughing. On the 10th, to my surprise, I noticed a sharp rise of temperature and some dyspnœa. On lung examination, the left one was found to be full of crepitations all over the back, other symptoms of pneumonia being more pronounced by the next morning. Thence the case was treated as pneumonia. She is now completely cured, but has been kept in the hospital for another ailment.

Points of interest:—

(1) None of the patients passed round worms though santonin was given; this excludes round-worm infection which might cause vomiting and diarrhœa.

(2) In neither case was there evidence of taking any irritating substance whatsoever, though careful enquiry was made regarding this.

(3) Both the cases were well conducted and kept sufficiently warm. There was nothing to cause one to suspect exposure to cold in the hospital to lead to pneumonia.

(4) In both the cases, Rogers' saline was given subcutaneously and not intravenously. Hence sudden œdema of the lungs may be excluded as a causative factor for bringing about pneumonia.

So vomiting and diarrhœa in these two cases may, I believe, be reasonably regarded as the prodromal symptoms of primary pneumonia.

My thanks are due to my chief, Dr. D. P. Williams, for his kind permission to publish this note.

A CASE OF STAB WOUND OF THE HEART.

By S. S. SEN, M.B. (Cal.), F.R.C.S. (Edin.),
Assistant Medical Superintendent, General Hospital, Rangoon.

A YOUNG Mohamedan male was stabbed in the thorax in a street nearby and was brought at once to the hospital. As he was bleeding profusely he was given morphia ¼ grain with 1/100 grain atropine, put under chloroform, and operated on at once. The usual hinge-flap incision was made and the vertical part of the incision extended down the middle of the sternum from the 3rd to the 6th costal cartilage; the transverse incisions were carried along the 3rd and 6th ribs respectively as far as the mid-clavicular line. After dissecting up the skin and fascia in one layer, the pectoralis major muscle was reflected from its sternal and costal origins, and the anterior intercostal membrane and intercostal muscles from the 3rd, 4th, 5th and 6th spaces were separated. With bone forceps the exposed cartilages were divided from their sternal attachments, bent laterally and broken at their juncture with the ribs. The pericardium was found to be cut, and a large amount of blood clot was removed from the pericardial sac. It was then found that the weapon had also penetrated the left ventricle, where a large blood-clot had fortunately prevented the escape of serious quantities of blood. This clot was removed and the heart-muscle wound sutured with fine catgut; the pericardium was also closed, and the wound in the skin sutured in layers. The patient was treated on the usual lines for shock, and he made an uneventful recovery. Since his discharge he has reported to me twice; he does not complain of any embarrassment of the heart, and in the *x*-ray report of the chest it is stated that the heart is quite normal.

Comment.—If no clot had formed in the left ventricle it is possible that the patient would have died instantaneously. It would be interesting to hear of other cases of a similar type with an account of their treatment. This type

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of case is a rarity in the annals of hospital practice, as most of the cases of the kind brought in for surgical treatment are dead or dying.

INTESTINAL OBSTRUCTION CAUSED BY RETROVERTED UTERUS.*

By J. N. GHOSAL, L.M.S.,
Basirhat.

RETROVERTED uterus, gravid as well as non-gravid, was the cause of total intestinal obstruction in the following three cases:—

Case 1.—Girl, aged 16 years, complained of constipation during each menstrual period which was painful from the beginning and rather scanty. Total intestinal obstruction set in last September with a tender lower abdomen and slight fever. The writer was called in to treat the condition and the above history was elicited after close questioning. Rectal and vaginal examinations confirmed the above diagnosis. A rectal tube relieved the patient of accumulated flatus and Hobbs' intra-uterine glycerine treatment diminished the congestion of the uterus and reduced its size. She was made to lie on her face for over three weeks after which she menstruated normally. Tinctura guaiaci ammoniata was also prescribed; it helped to relieve the dysmenorrhœa.

Case 2.—Female, 32 years, 10-para, delivered of her last child at full term four weeks before. On the third week she complained of colicky pains and within 4 days presented signs of complete intestinal obstruction with fæcal vomiting. Dilated coils of intestine were visible and she was writhing in pain. Rectal examination showed the retroverted fundus pressing on the rectum. A no. 20 catheter was manipulated past the fundus and she was relieved of flatus and some fæcal fluid. Hobbs' glycerine injection was given with good results and she was kept lying on her face for some time.

Case 3.—Female, 21 years, mother of 2 children, history of abortion six months previously, presented signs of total obstruction of urine and fæces, with pain and slight swelling in the appendix area and slight fever. The attending doctor had diagnosed appendicitis. On rectal and vaginal examinations, a gravid retroverted uterus was felt and enquiry elicited a three and half months pregnancy. An œsophageal tube was slowly introduced past the obstruction; this greatly relieved her. She aborted 12 hours later and was advised to lie on her face for at least a fortnight. This she refused to do and a month later she again had all the signs of intestinal obstruction following an enlarged menstruating uterus, and this occurred again at her next period. She was ultimately persuaded to wear a pessary and lie on her back for a long time.

Comment.—The interesting features in the above cases are:—

1. Menstrual derangement is liable to produce symptoms of intestinal obstruction even in a non-gravid uterus.
2. A retroverted uterus may conceive but abortion within 4 months is the rule.
3. So long as the fœtus is alive, signs of complete intestinal obstruction are not manifested. Death of the fœtus renders the fundus a dead weight which causes complete obstruction.
4. Unless the retroversion is duly corrected, subsequent menstruation may reproduce all signs of intestinal obstruction.
5. These cases are difficult to diagnose but yield readily to treatment.

(The writer regrets that there are no published statistics showing the proportion of obstruction cases in adult males and females, or giving the common ætiological factors for obstruction in Bengali females. The writer's experience is, (*a*) cases of intestinal obstruction in adult females are rare in comparison with those in adult males; (*b*) a retroverted uterus is possibly an important factor in the causation of obstruction in adult females; fibroid growths in the uterus and cancer of the lower bowel are next in importance; strangulation, stricture, twists, etc., are of minor importance.)

*This paper has been re-arranged by the Editor.—I. M. G.

A NOTE ON THE USE OF THE SLIT-LAMP.

By JADAVJI HANSRAJ, D.O.M.S. (Eng.),
Bombay.

A CASE I met with in my private practice a short time ago fully convinced me of the usefulness of this instrument in diagnosing certain pathological conditions of the eye.

A young man, aged about 22, mechanic by occupation, was working with a hammer in the workshop, when suddenly he was hit in the right eye by a small piece of iron from the hammer. This was about the 7th of March. He was treated by the local doctors and by two or three ophthalmic surgeons at different places. On the 19th of March he came to me for consultation for pain and redness in the right eye. On examination I found:

(1) Ciliary injection of a moderate degree.
(2) A white scar in the inner and upper part of the cornea, about 4 mm. long and 1 mm. broad.
(3) Anterior chamber rather shallow.
(4) Iris slightly discoloured.
(5) Pupil almost normal in size with a well-marked posterior synechia almost round the pupillary margin.
(6) Pupil reaction totally absent.
(7) Lens semi-opaque; the opacity more marked on the nasal side.
(8) Vitreous full of exudation, and a suspicion of detachment of the retina.
(9) Vision, moving bodies only.
(10) Projection of light good all round.

I could not find any foreign body in the eye with the ophthalmoscope.

The main question was, whether there was a foreign body in the eye or not, and the whole treatment and the prognosis depended on this vital question. Atropin solution was put in and the pupil dilated a little. On putting the patient under slit-lamp examination, there was seen a small aperture in the inner and upper side of the iris corresponding to the white scar in the cornea. On examining the lens, there was found a very small faint tear in the capsule of the lens, in line with the aperture in the iris. There were well-marked watery globules round about this aperture. A scar in the cornea, a small perforation in the iris corresponding with the scar, and a tear in the capsule of the lens-substance convinced me that the foreign body was in the eye. *X*-ray examination of the patient later on confirmed the above diagnosis.

In big towns where an *X*-ray examination is available, one can very easily assign a secondary place to a slit-lamp examination in such cases; but in places where no *X*-ray apparatus can be found, slit-lamp examination would be a great help.

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TETANY FOLLOWING MEASLES.

By J. N. GHOSAL, L.M.S.,
Basirhat.

History.—A Hindu boy, aged 5 years, had measles-like eruptions in February last when an epidemic of measles was raging. The eruptions faded away after 4 days and the boy was given normal diet. On the night of 24th February, 1931, he suddenly became delirious with a temperature of 103°, tympanites, suppression of urine, etc. Next morning he began getting fits and as there was no abatement of symptoms, the writer was called in in consultation.

Signs.—The boy presented the following signs:—Partial trismus, tetany-like spasms of the arms (fingers flexed at the metacarpo-phalangeal joints, extended at the terminal joints and pressed closed together), wrists and elbow joints flexed and the arms folded crosswise on the chest; neck retracted backwards, lower limbs extended and toes abducted. Knee-jerk was present, pupils normal; he appeared rational though he had not spoken since the 24th. There was no history of trauma.

Trousseau's sign was elicited, strong pressure on the arms, compressing the vessels, brought out spasms. Chvostek's sign was tested for the next day, but as there was a permanent trismus with drawing up of the corners of the mouth, this sign was not positive. Up to 5th March, 1931, the boy remained in this condition getting fewer spasms, which resembled neither tetanus nor epilepsy but had the characters of both. There was never complete trismus or spasms of the lower extremities, nor unconsciousness, and although he spoke not a word and remained in one position, his looks were never wandering nor altogether meaningless.

From the 6th, the spasms became few and far between but a new sign developed; he was found smiling occasionally and imitating the cries or laughs of children around him. This was so marked that the attending doctor brought out a smile from the boy by smiling himself. Twice the writer heard a loud laugh from the boy's lips, but all the while he was lying like a statue.

Treatment.—He had to be catheterized on the first two days but thenceforth passed urine normally. The bowels were loose in the beginning but latterly he had to be regularly relieved by enemas. At first feeding by the mouth was somewhat difficult and he had to be partially fed by the rectum; but from 3rd March he took liquid food by the mouth and swallowed easily in spite of the trismus.

Parathyroid gland tabloids, calcium lactate and *Makaradhaj* checked the spasms for three days and allowed him to take nourishment by the mouth. But there was an aggravation of fits and santonin was tried as there was a history of teeth-grinding and worms; this did not give any relief. Then big doses of ammonium chloride with glucose were injected into the rectum. Luminal was also given. No marked action was visible but the disease seemed to pursue a milder course and gradually it spent itself.

From the third week of March he began to manifest interest in his surroundings and voluntary movements commenced very soon. As his limbs had been all along massaged with cod-liver oil and sunned regularly from the beginning, he recovered fully without loss of any function.

Interesting features.

1. The onset suggests a parasitic origin.
2. Fever was present during the first week of the attack only. The rest of the period was afebrile.
3. Reflexes were normal and there never was any sign of catalepsy present.
4. Spasms were confined to the arms, chest, neck and face; they were paroxysmal. The arms were so rigidly bent that it was difficult to straighten them even in the interval between the spasms.
5. His imitation of laughing and crying was a unique feature.

DEATH FROM ACUTE PULMONARY ŒDEMA DUE TO SCORPION BITE.

By S. K. SUNDARAM, B.A., M.D.,
Headquarters Hospital, Tanjore.

THE report by Dr. H. T. Ince in the *Indian Medical Gazette* of April 1931 of acute pulmonary œdema resulting from scorpion bite reminded me of a similar but fatal case I had in March 1930.

P., a boy of 18 years, was admitted into my wards in the Rajah Mirasdar District Headquarters Hospital, Tanjore, on the 2nd March 1930 with a history of scorpion sting on the left index finger five hours previously. On admission, the boy complained of pain in the chest and spitting of blood. The dominant feature on physical examination was marked coarse and fine râles all over the chest and the constant bringing up of blood-stained thin frothy expectoration. In spite of a variety of circulatory and respiratory stimulants given in quick succession and repeated injections of atropine, the patient died on the 4th March 1930.

Post-mortem Notes. The pericardium and heart show a few petechial spots on their surfaces. The surface of the heart is slightly reddened. All the cavities contain partly clotted and partly liquid blood. The mitral and tricuspid valves show slight thickening. Both the lungs are congested, especially at the bases. Section exudes liquid blood and froth. The liver is mottled on section. The spleen and kidneys are slightly congested.

ANGIONEUROTIC ŒDEMA.

By J. N. GHOSAL, L.M.S.,
Basirhat.

N. K., AGED 32 years, narrated the following history:—About five years before he observed intermittent "swellings" of his hands, forearms, and arms. This went on for a year. He then had an attack of cholera after which there was no recurrence of the "swellings" for a year and half. Since then however the following symptoms have appeared:—

(1) Swellings on the arms, forearms, and back. These were painless and did not pit on pressure. They never lasted for more than 3 days at a stretch.

(2) The swellings on the back always caused a sensation as of a pillow, and he felt very uneasy on changing sides because "the œdema used to change sides with him."

(3) For the last two years he has been suffering from rheumatic pains, flitting from one part of the body to another.

In spite of a normal full pulse, the blood pressure was very low, systolic 90, diastolic 65, pulse pressure 25. This did not prevent the patient from cycling 30 to 40 miles at a stretch without much exertion. His urine was normal.

Treatment.—Yatren-Casein (Strong) was regularly injected once a week and internally he was given calcium lactate gr. 10, Tabloid thyroid gland gr. ½, and

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Tabloid suprarenal gland gr. 5, thrice daily (to combat hypotension).

For 9 months he was free from all symptoms but he relapsed again. This time the writer injected 2 to 5 c.c. of the patient's own blood once a week, with excellent results. He got the hint from Schulmann, who, observing a stage of hæmolysis in several cases of Quincke's disease, considered anaphylaxis as a cause and advocated auto-hæmotherapy as a reliable line of treatment. Desensitization takes place within 2 months according to this writer.

Comments.—This case is very interesting. Periodicity was present as in other reported cases; but there were no urticarial symptoms, pain, heat, redness and itching being completely absent. The "swellings" were confined to the backs of the hands, arms, forearms and the back; once only, the right side of the face was swollen. The low blood pressure combined with the above appearances points to a vaso-motor disorder, "under the influence of which the permeability of the vessels is suddenly increased."

TWO CASES OF DRUG DERMATITIS (DUE TO THE USE OF CHRYSOPHANIC ACID).

By R. C. SRIVASTAVA, B.SC., M.B., B.S.,
Roorkee.

Case 1.—A patient came to me with an œdematous face, the œdema being more marked on the right side than on the left. There was a definite spreading margin upon which vesicles were making their appearance; these vesicles contained turbid fluid. The whole area was covered with an erythematous pigmented rash of the scarlatiniform and morbilliform type. The patient complained of intense itching and burning sensations and the whole face was so distorted that he was scarcely recognisable. On palpation, the area was found to be slightly warmer than the surrounding skin but there was neither fever nor any other constitutional symptom. On enquiry I found that the patient had been applying an ointment containing chrysophanic acid to the skin behind his right ear.

Treatment.—The ointment containing chrysophanic acid was discontinued at once and the part was kept constantly moist with lead and opium lotion for two days. This diminished the swelling to some extent and the burning sensation also practically disappeared though the patient continued to complain of itching. The following lotion was then substituted for the lead and opium lotion:—

Liquor potassae	ʒii
Spiritus rectificatus	ʒii
Aqua rosae	Oi

The use of the above lotion for another three days restored the area to normal with the exception of the pigmentation, for which alkaline baths externally and arsenic internally have been used. Though they have been tried for over one month, yet faint marks of pigmentation are still persisting.

Case 2.—In this case the eruptions were papular and the area was deeply pigmented. Itching and burning were not very marked. This case represented a very mild type of dermatitis and was easily brought under control.

Both these cases represent the extreme types of dermatitis (due to chrysophanic acid), the former case was so severe as to be mistaken for erysipelas but the latter was a very mild form of dermatitis; another curious fact though of no scientific interest was the coincidence of both these cases in the same month.

(*Note.*—From the context there is no evidence that the dermatitis in case 2 was due to the use of any medicinal preparation containing chrysophanic acid.—EDITOR, *I. M. G.*)

A CASE OF MYIASIS OF THE NASAL CAVITY.

By R. V. GAJENDRAGADKAR, L.M.P.,
Osmanabad.

D. R., AGED 75, an inhabitant of Osmanabad came to me in October 1930 for treatment with the following complaints:—

Severe pain in the frontal region of the head, swelling, continuous bleeding from the left nostril, and gnawing sensation in the nose and head. The patient gave a history of a similar attack some 8 years ago when thousands of maggots came out. The bleeding was so severe that I was frightened by its nature. So I first irrigated the nasal cavities with phenyl solution and then with calcium chloride solution and put in turpentine drops; this line of treatment neither brought out any larvæ nor gave any relief and I was called again at 2 p.m. on the same day. I prepared the following nasal drops:—

Creosote	m.x
Oil of turpentine	m.x
Camphor	gr.x
Iodoform in olive oil	ʒss.

These were administered without result.

On the following day I irrigated the nasal cavities with a strong solution of potassium permanganate together with insufflation of boro-iodoform; oil of turpentine solution swabs were then packed into the nostrils. I also mixed equal parts of potassium permanganate and iodoform and directed the patient to use this as a snuff. This brought out some 10 larvæ in the afternoon, but the gnawing pain was so great that the patient used to strike his head against the wall.

The same treatment was carried out on the following day. This brought out thousands of larvæ in the afternoon and relieved the pain.

On October 12th the nose was irrigated with potassium chlorate solution and oil of turpentine plugs were put in; 10 more larvæ were extruded and the patient had no complaints whatsoever for 3 or 4 days. The gnawing sensation returned again and irrigation with a chloroform-camphor solution was practised. Turpentine swabs were also put in but the patient began complaining of a dizzy sensation and heaviness in the head hence the former method was resorted to and continued for about a week with an occasional purge. This cured the patient completely.

Special Articles.

MEDICAL EDUCATION.*

By S. L. Bhatia, M.C., M.A., M.D. (Cantab.), M.R.C.P. (Lond.), Major, I.M.S., Dean, Grant Medical College, Bombay.

ON casting a glance at the year that has just ended, the first thought that occurs to one is the pronounced economic depression that has prevailed in the medical profession, in common with the rest of the community. But perhaps the distress is more acute in our profession than in any other, for the reason that medicine is a vocation of the learned, and learning has fewer rewards, except when acquired for its own sake. The training

* Being the presidential address on the occasion of the Annual General Meeting of the Grant College Medical Society on 8th March, 1931.

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of the undergraduate is long and expensive, and the future prospects of the qualified doctor less promising than ever. I may tell you briefly what has been happening in the sister Presidency of Madras. The Government of Madras appointed a committee in 1928 to examine certain questions connected with the future of medical education in that presidency. The report of the committee was published in April 1930. Some points in the report* are worthy of our consideration.

The committee prepared a questionnaire, which was issued to various medical men and women in the Presidency, representing teaching and non-teaching services, and also to a large number of non-service members of the profession possessing various and diverse qualifications. A modified questionnaire omitting matters of a technical nature was issued to lay bodies, *viz.*, to all district boards, municipalities and taluk boards. The questionnaire dealt with:—

(1) The number of medical men and women who could be expected to earn a reasonable livelihood:—

(*a*) in government or other paid services,

(*b*) with the help of rural dispensary subsidies, or

(*c*) in unaided private practice.

(2) The location of medical educational institutions and the system of staffing them, and

(3) The minimum standards of education.

The report states that the general consensus of opinion, both in the answers given by medical practitioners as well as by the lay bodies, showed that there was evidence of an increasing difficulty in earning a reasonable livelihood, especially among the junior members of the profession, and that even in some rich districts like West Godaveri, where opportunities for private practice may be expected to exist, as many as 50 medical men were leading a hand-to-mouth existence. The fact that 378 applicants appeared for vacancies before the committee which sat recently to select sub-assistant surgeons is ample evidence of the difficulties which are being experienced by medical men in getting suitable employment. This is not confined to juniors, but is also felt by men who have settled down in practice for seven or eight years. It has also been gathered that while at the present moment there is not much actual unemployment, there are good reasons to believe that the economic prospects in the medical profession are rapidly deteriorating, and that the existence of this economic pressure, not only lowers the ethical standards and the status of the members of the profession, but also has an adverse influence on the quality of applicants for admission to the medical colleges and schools. The ultimate result will undoubtedly be a deterioration in the quality of the medical aid which will be available to the public. It had been hoped that considerable numbers of medical men would find employment in the villages, but this hope has not yet been justified.

The chief reasons for the unpopularity of rural practice are:—

(1) Lack of opportunities for private practice.

(2) Absence of social amenities.

(3) Lack of facilities for the education of families.

(4) Anxiety as to fixity of tenure owing to the appointment being dependent on the pleasure of the local bodies.

The committee state that this last factor has been mentioned in a large number of replies from the members of the medical profession and the committee feels that the subsidized practice would be more attractive if the rural medical practitioners' tenure of appointment depended on the report of the district medical officer instead of on the pleasure of the local body and strongly recommends that the subsidy be paid direct by government on the production of a certificate from the district medical officer to the effect that the rural medical practitioner has been doing satisfactory work.

On a census being taken of the number of medical practitioners, including women, who could be expected to earn a living wage by unaided private practice, it was estimated that about 100 might be absorbed by this method in each year. If to this figure is added 50 medical practitioners who may be required yearly for subsidized dispensaries and about 35 for government services, a total number of 185 medical practitioners may be expected to be absorbed yearly. Adding a margin of 15 for other forms of employment, the maximum number of medical men and women who have reasonable prospects of employment is about 200 a year. The committee is of opinion that, instead of turning out an unlimited number of qualified doctors, the policy of the government should be to educate only the number of medical men and women who can reasonably be expected to earn modest incomes. It is only under such circumstances that the tone of the profession can be maintained. Estimates have been made of the numbers of medical men in relation to the total population of Madras, and these figures have been compared with those which obtain in other countries. Such a comparison is fallacious as in the western countries where the ratio of medical men to the population is higher than in Madras, there are no unlicensed hakims, vaidyas, barber surgeons, etc., who contribute to the medical needs of the people; if these practitioners are taken into account the ratio of medical men to the population of Madras will compare favourably with that which prevails in other countries. The need of Madras is not so much for more doctors as for better doctors. The committee further notes that the numbers of applicants for admission to the medical schools have fallen off during the past few years, the chief cause being the diminution in the prospects of earning a living, while another factor is the growing dissatisfaction with the diploma (L.M.P.) which is granted at present. There is also evidence that while there is not much indication of a falling off in the quality of the students in the colleges, the educational qualifications of candidates for admission to the medical schools have deteriorated very greatly during the past two or three years.

I have quoted the views of the committee *in extenso*, for it would appear that the conditions as regards the present position of the medical profession are to a great extent identical in the Madras and Bombay Presidencies, and the remedies proposed in one case would presumably be applicable to the other. Obviously one method of dealing with the problem of unemployment in the profession is to control the production of fresh recruits. But it is to be observed that the economic forces are working already, in such a way, that the number of admissions to our medical college in Bombay has automatically gone down during the last few years. Another remedy is a more uniform distribution of medical men in all parts of the Presidency especially in the rural areas. At present there is too great a tendency for men to settle down in large towns; but before they can be induced to go to the villages, the conditions of rural practice should be made more attractive. It seems to me that an enquiry such as that mentioned above if undertaken in Bombay Presidency will yield interesting and fruitful results.

An integral part of this problem is the question of post-graduate medical education. The process of education ought not to end with the acquisition of a degree or diploma at the university or the medical school. It must be continued throughout life. Such continued training is of the utmost value to the practitioner himself and also to his patient. It is now well recognised that the medical practitioner should be given necessary facilities to refresh and add to his store of knowledge from time to time. During my recent visit to Europe I was especially interested to learn what arrangements had been made at different training centres for post-graduate medical education. In England, there are signs of active efforts in this direction. In January 1921, Dr. C. Addison, the Minister of Health, appointed a committee under the

* Government of Madras, Local Self-Government Department, Public Health G.O. No. 851 P.H., 7th April, 1930.

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chairmanship of the Earl of Athlone to investigate the needs of medical practitioners and other graduates for further education in medicine in London, and to submit a practical scheme for meeting them. The report of the committee was published in May 1921. The committee, after summarising briefly the chief measures adopted in London and elsewhere to provide facilities for post-graduate medical instruction, attempted to define the nature and extent of the demand for such instruction and mentioned the following categories of persons requiring consideration:—

(*a*) Graduates who have recently qualified.

(*b*) General practitioners of some years standing who require general courses in medicine and surgery.

(*c*) Graduates from home and abroad who need instruction immediately after qualification with a view to a higher degree or diploma.

(*d*) General practitioners who seek instruction in special subjects.

(*e*) Officers in the services, Navy, Army, Indian and Colonial.

(*f*) Graduates who require facilities for extended medical research.

(*g*) Graduates from abroad falling in categories (*b*), (*d*) and (*f*) above.

The Committee recommended that:—

(1) A school attached to a hospital centrally situated in London should be devoted solely to post-graduate medical education.

(2) The school should be a school of the University of London, and receive substantial financial assistance from the Treasury through the University Grants Committee.

(3) In addition to the course provided at the central school for the full time instruction of the general practitioners and at existing post-graduate colleges and schools, further facilities for post-graduate study should be made available at non-teaching hospitals and in Poor Law infirmaries.

(4) It is desirable that increased use should be made of cottage hospitals in which all general practitioners of the neighbourhood should have the right, if they so desire, to treat their patients.

(5) A much larger number of resident appointments and clinical assistantships should be created in hospitals and Poor Law infirmaries.

(6) A central office should be established to co-ordinate and develop the work of post-graduate education in London. In the administrative building, should be provided not only offices but the accommodation necessary for social purposes.

(7) An Institute of State Medicine should be established by the University of London in which instruction should be given in public health, forensic medicine, medical ethics, and economics.

Again another committee was appointed in 1925 by Mr. Neville Chamberlain, the Minister of Health, to draw up a practicable scheme of post-graduate medical education centred in London. The report of the committee was published in April 1930. The Committee notes the pioneering steps in this direction taken by Sir Jonathan Hutchinson, Sir William Broadbent, and Dr. Theodore William and the Medical Graduates College and Polyclinic, and the museum founded by Hutchinson. The Fellowship of Medicine founded in 1919 under the initiative and influence of the late Sir William Osler, with its headquarters at 1, Wimpole Street, has been doing excellent work. Latterly the Fellowship of Medicine was amalgamated with The Post-graduate Medical Association, and several of the great hospitals and medical schools, and almost all of the non-undergraduate general and special hospitals were affiliated with the Fellowship of Medicine. With their co-operation a continuous programme of post-graduate courses, lectures and demonstrations was arranged throughout the year.

In addition, as is well known, some of the large hospitals make post-graduate provision for their own old students and others. The committee makes important recommendations. It states that the most serious defect in the existing provision for the further education of medical practitioners in London is that there is no hospital and medical school in London exclusively devoted to providing post-graduate medical education. They propose the establishment of a British Post-graduate Hospital and Medical School in London, and make an important observation that it is an essential condition of effective post-graduate teaching in medicine that post-graduate and undergraduate students should not be taught in the same medical school. They, therefore, suggest that the Hammersmith Hospital, one of the public hospitals in London, which under the Local Government Act of 1929 would become a County Council hospital in April 1930, should serve as the possible basis for the establishment of the British Post-graduate Hospital and Medical School. The scheme has been worked out in all its aspects, financial and otherwise, and we may look forward in the near future to its taking a practical shape. This will afford excellent facilities to our graduates who go to England for post-graduate medical studies. In describing the history of this movement in England, I am also hoping that similar enquiries will be set up in our own country to explore the ways and means of providing the same facilities for post-graduate training in India.

I have studied the conditions in Paris and Vienna also. In Vienna, as you know, there is an extensive organisation for the post-graduate training of medical men. The University of Vienna organises a number of such courses to meet the special needs of general practitioners, specialists and research workers. The American Medical Association at Vienna supplies a special need in this respect. Intensive training in different branches of medicine and surgery is provided by the university teachers, mostly in English, and these facilities are much appreciated and taken advantage of.

As regards undergraduate medical education, I may state that there is a general movement to simplify the curriculum, and if possible to reduce its length. In this connection I invite your attention to Dr. A. E. Barclay's Silvanus Thompson Lecture on "The Danger of Specialisation" delivered before the British Institute of Radiology on December 5th, 1930 (*Lancet*, December 13th, 1930) in which he makes some significant remarks on the modern tendency to specialise in the medical profession and its attendant dangers. Still more significant are his references to certain defects in the medical curriculum. The specialist is defined as a man who knows more and more about less and less, while the practitioner is one who knows less and less about more and more. And it is in this, according to Dr. Barclay, that the danger lies. Opinions may differ about the value of specialisation, but there is a good deal of truth in what he says about medical education.

He states, in effect:—

(*a*) That the existing medical curriculum is much too long. It is nearer eight than seven years before a student can qualify.

(*b*) That it is not till a student has qualified that he is able to take responsibility and see his life-work from an angle that is far different from that of examinations.

(*c*) That there is not enough opportunity for the student to get the general education on which to base his long years of purely specialist study.

(*d*) That the medical curriculum has become unwieldy owing to the large and ever-increasing number of subjects that are thrown into it.

(*e*) That it is sometimes forgotten that to the medical student the most essential of all studies is the study of man. This he has to learn for himself. No teaching except that of mother wit can give him the wisdom that leads to an understanding of human nature. The student has little chance of developing this essential part of his training.

(*f*) That there is a wide gap between the subjects of anatomy and physiology and the subjects of the final years.

There is nothing new in these observations. Many of us who have to do with the medical education have

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felt the same. The length and unwieldiness of the medical curriculum is a problem that needs to be investigated. The medical curriculum in the Indian universities is much the same as in British universities. In Bombay, for instance, after matriculation the student spends two years in an Arts College where he studies English, a second language, mathematics, physics, chemistry and biology. After the Intermediate Science Examination he joins the medical college, where during the first five terms (one academic year is composed of three terms of 12 weeks each), he studies human anatomy and embryology, physiology, organic chemistry, and biophysics. The next three years (nine terms) are devoted to the study of pharmacology (including materia medica and practical pharmacy), pathology, bacteriology, hygiene, ophthalmology, medicine, surgery, obstetrics, gynæcology, medical jurisprudence, mental diseases, radiology, dermatology, infectious diseases, diseases of the ear, nose and throat, anæsthetics, dental surgery, vaccination and venereal diseases. The list of subjects specially for the final years is ever on the increase. The minimum period in which a student can qualify after matriculation is six and a half years, but usually it is much longer, about seven or eight years. There is need for a comprehensive survey of the whole field of medical education in India with the object of framing a curriculum not too long and unwieldy, which is especially adapted to the needs of medical practice in this country. It should comprise the essentials of the fundamental sciences which the medical man is called upon to practise in later years. As suggested by Dr. Barclay all instruction in technique should be eliminated except for those who intend to specialise. At the same time, ancillary sciences, such as anatomy and physiology, should be taught in their relationship to practical medicine, and the existing gap between them should be bridged as far as possible. The student should have sufficient leisure to think for himself and imbibe all that he is taught.

The danger of specialisation which Dr. Barclay refers to is not imminent in India yet, for specialisation is still in its infancy. The primary aim of medical education is to train general practitioners, who are the backbone of the medical profession. This training should be on the broadest lines possible, so that the product of our medical colleges is a man with a cheerful, sympathetic, and optimistic outlook on life who possesses the freshness and vigour of youth, an intellect which is ever keen to learn, is receptive, adaptable, critical, with a due sense of proportion, and not crushed by a lengthy, rigid and unwieldy curriculum, and by a long series of examinations.

Side by side with the question of undergraduate instruction, the problem of post-graduate medical education in India, as I have already mentioned, needs urgent attention. "If" as Dr. Barclay truly says, "a very broad basis of education is essential for critical appreciation of specialised knowledge," it is also true that having once made the necessary provision for a broad basis of undergraduate medical instruction, ample facilities should be available for training in specialised knowledge after qualifying. It is in post-graduate medical education that our Indian universities are specially lacking. It is true that in some centres as in Bombay special efforts have been made in this direction. Here the University has instituted a Diploma in Ophthalmology, degrees of Bachelor and Doctor of Hygiene, Master of Surgery, and Doctor of Medicine. Quite a number of post-graduate students study for these degrees and diplomas. But much more remains to be done. The need is specially great for clinical courses in special subjects for the practising physician, who desires knowledge, but does not aspire to obtain post-graduate degrees and diplomas.

From the very commencement of his studies, the medical student should be made to realise the nature of his task in later years and the ideals of the profession to which he has the honour to belong. This is aptly described by R. L. Stevenson:—

"There are men and classes of men that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the physician almost as a rule. He is the flower (such as it is) of our civilization; and when that stage of man is done with, and only remembered to be marvelled at in history, he will be thought to have shared as little as any in the defects of the period, and most notably exhibited the virtues of the race. Generosity he has, such as is possible to those who practise an art, never to those who drive a trade; discretion, tested by a hundred secrets; tact, tried in a thousand embarrassments; and what are more important, Heraclean cheerfulness and courage. So it is that he brings air and cheer into the sick room and often enough, though not as often as he wishes, brings healing."

Thus, would it not appear that in order to train a man or a woman for the profession of medicine, we should employ the best of wisdom at our command?

But apart from all this, a society, such as the Grant College Medical Society, has an important place in the education of the medical man. Plato said that education is a life-long business. The doctor's education comes largely from his patients, books and journals. But a society lays the foundation for that unity and friendship which is essential to the dignity and usefulness of the profession. It offers a rare opportunity for the exchange of views, and in the words of the late Sir William Osler "helps to keep a man up to the times, and enables him to refurnish his mental shop with the latest wares." The Grant College Medical Society is the direct successor of the old Medical and Physical Society of Bombay, the oldest society of its kind in the Presidency, to whose deliberations the Grant Medical College largely owes its existence. Therefore this Society by virtue of its long traditions has a special mission in regard to the training of the physician. Let me conclude by reminding you of the famous words in the Epistle to the Hebrews:

"Let us hold fast the profession of our faith without wavering—and let us consider one another, to provoke into love and to good works: not forsaking the assembling of ourselves together as the manner of some is."

THE PROBLEM OF TUBERCULOSIS.

By G. McGUIRE, I.M.D.,
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INDIA is proverbially the land of philosophy, the land which conjures up visions of tropical beauty, and the land in which civilization had its birth. But she now lags behind in the evolution of mankind—rapidly losing her position amongst nations through her deep-rooted caste prejudices, her superstitions and priest-craft. She has become a slave to custom and proceeds in the same jog-trot manner.

No doubt these social and religious traditions once upon a time fulfilled a beneficent purpose, but having fulfilled that purpose they have out-lived the conditions which justified their existence, and, as much as they deserve gratitude, they are not entitled to perpetual adherence. The realization for the need of a newer and higher level is gradually dawning, and India is casting off her traditions of bondage and awakening to the fact that if she desires to survive in the strenuous struggle of modern life she must make continual re-adaptations and re-adjustments to new environments, otherwise there will be stagnation and finally dissolution.

It is her moral duty to face new difficulties as they arise along the course of human evolution. Awakened and intelligent Indians are at the present time chiefly occupied with the ambition for the attainment of political freedom for their country and, therefore, their eyes are turned away from other matters of graver importance, from a danger lurking in their very midst and sapping the strength and vitality of the whole country.

The ravages of tuberculosis are to be seen everywhere. No class is exempt. We find it in the hovel of the

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poor and the mansion of the rich. It has become a menacing cloud on the horizon, ever growing larger and blacker, and it should be looked upon with alarm and anxiety. If this disease continues to take its devastating toll, what will be the eventual fate of the country? Will India ever be able to boast of being a nation? People have not as yet realized the vast and far-reaching national importance of the problem of tuberculosis, and the inevitable consequences to the welfare of millions of people, who toil hard, and are more or less shelterless. If India is to be renovated and re-incarnated and if she has any love and pity for her people, she must be practical and save herself. Let her show it now by taking time by the forelock and turning seriously to the paramount problem of importance, the health and strength of her people. Let this historical land be raised with its vast area, its ancient civilization, its multitudinous population and its natural resources. To attain real political freedom without controlling this disastrous evil, which is undermining a future nation, would be useless. It is health and health alone which can awaken the spirit of strength and unity and love of country, on which stands the foundations of a successful people.

Realization of the fact that tubercle-infected persons are a real danger to society has not been sufficiently impressed upon the minds of the public, and until these unfortunate victims are isolated in the earliest stages there is very little hope of coping with the spread of this disease. India has failed in its duty in not having tackled this problem earlier, but there is yet time to grapple with the danger before it goes beyond control.

There is very strong reason to believe that physical deterioration is increasing among the men of to-day. In the matter of stature, build, weight, physical endurance and resisting power the young men of to-day do not compare with their fathers when the latter were of the same age. Physical deterioration is a fact, and not an impression; it is the physically-deficient type which eventually joins the ranks of the victims of tubercle and becomes a social menace. The swelling ranks of these victims should be an incubus upon our minds, as they are refused admission into sanatoriums if the disease is advanced, and are left to *exist*, spreading infection which claims further victims. These unfortunate victims cling tenaciously to life, they cannot believe that the seal of death is upon them, and yearn more than ever for a return to health—eagerly believing in their eventual cure. "Hope springs eternal in the human breast."

It is, therefore, our bounden duty to endeavour to better the condition of these unfortunates. Let them be properly cared for, increase their material comfort, surround their lives with interest, and thus help them to cease from the main concern of the future. Many great men have devoted their lives to solve the problem of a cure for the good of humanity; many theories as to the cause have been propounded; good advice has been handed down for generations; sanatoriums have come into existence; and special hospitals have been built; but the disease continues on its unrelenting way, taking its toll and increasing in severity. The general public is fully aware that attempts to cure have utterly failed. Patients returning "cured" from sanatoriums look well and feel fit, but in a very short time they relapse into their former condition.

The initial step would be to discourage the multi-millionaire merchant from spending his wealth in building temples, mosques, wells and *serais*, and leaving the remainder to his sons to dissipate on crazy luxury. Let him be encouraged to spend this wealth on the medical needs of the country, in alleviating human suffering, so that India may be proud of her future generations.

Sanatoriums are generally built in the hills, in semi-popular places which are usually health resorts of the middle classes, and are always easy of access. These institutions, once opened, soon become popular and in spite of the rigorous precautions of the authorities, it is impossible to restrict the disease within the boundaries of the institution owing to the peculiar habits of the people. Thus, a small hill station, once a health resort, now becomes a danger zone, and the disease eventually claims the residents of the station as its victims. A sanatorium is, therefore, really a curse in disguise. They are springing up all over India in the endeavour to do good. This applies with equal force to tuberculosis hospitals in the plains, which aim at the amelioration of the sufferings of the sick and dying, and are therefore laudable, but through intimate contact of these patients with their relatives and friends the spread of the infection is unchecked. Then, again, those in an advanced state of the disease are refused admission to these sanatoriums. They remain with their relatives, often uncared for, in over-crowded cities, hundreds and thousands of persons becoming infected from just one case.

Sanatoriums, therefore, if not admitted to be a danger, certainly do not restrict the disease to any appreciable extent, but really defeat their own ends. A typical example of the dangers of a sanatorium in the midst of a populated area is to be seen in the serious aspect of affairs in Switzerland to-day. A country once world-renowned as a health resort and for its success in the treatment of tuberculous patients has now become a hot-bed of tuberculosis.

The disease is spreading in all directions and the yearly toll is the cause of much uneasiness and anxiety. Is it not time that something is done to check this evil in India?

No feature of the administration of the British Government in India is more worthy of applause than the ever-increasing yearly attention paid to the necessity for institutions for tuberculosis. Money is being spent lavishly on hospitals and sanatoriums. Science is still busy investigating and theorising. New treatments are being rigidly followed, namely, heliotherapy, occupational therapy, artificial luminous radiation, ultra-violet rays, and orthopædic treatment. The relationship of the meteorological, geological or sociological conditions to the disease is being observed and studied. Health leagues, educational committees, industrial welfare associations, maternity and child welfare centres, and other social movements have each and all borne fruit in their own way.

The bracing climate in the hills among Hiram's cedars and the pines and deodars of Kashmir, and other hill stations, at varying altitudes, has been tried. The results have been no better, or very little better, than those in the sanatoriums built in the hot and muggy plains of Bombay and Madras. Temporary "miraculous cures" have come about spontaneously, but no one knows why these occur as frequently in the plains as in the hills. Open air treatment has not proved very promising and drugs have been of no avail. The high road to success is not yet in sight and a specific still awaits discovery.

In the meanwhile we are over-looking the most important factor for the interests of humanity; while awaiting the rain from above the fire is eating away the main structure, and we should now, without delay, insist upon complete *isolation* of all tubercle-infected, or suspected, persons. The people must learn to sacrifice individual interests to the interests of the country. Greed, selfishness and egoism should now be left behind. The truth must be brought home to the mind of the individual, and he should be made to realize the amount of responsibility which devolves upon him and the obligation he owes to the nation of which he is a member. It is only then that India will be able to follow the example set by Sparta to the peoples of the world. Individual wishes, individual freedom, and personal and private considerations were sacrificed without hesitation to the strength and permanence of their State. The individual was for the State and not the State for the individual. Marriage was solely for the good of the State and no sickly or diseased man or woman thought of marriage. Of their own accord they refrained from marrying. Children were brought before

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a committee soon after birth and if any were found defective, they were put to death. Modern civilization does not permit us to destroy our mentally and physically weak children as the Spartans did, but the custom is specially deserving of mention in that it serves to show the extent to which personal sacrifice was carried for the good of the State. A Spartan mother while burying her son who was slain in battle cried, "Oh, your fate. Yes, by the Gods a glorious fate, for did not I bear him that he might die for Sparta." As among the Spartan races, so should all races lay great stress on physical education. Physical culture and social hygiene should be compulsory subjects in the schools. The future belongs to the youth of to-day and, if we succeed in educating the youth of to-day to the hygienic lives, hygienic life will become the common habit of the future, and remove more than half the evils in India without any extra expenditure. Methods should be adopted to awaken the people to the real situation and the needs of the country and to the danger of playing with tuberculosis, which is a double-edged weapon, destroying not only families but the nation also. Government should retrench and economise in the unproductive departments of the public services and devote more of the people's money to objects which intimately affect their lives.

Every tuberculosis patient, whether in town or village, should be traced and removed for isolation and arrangements should also be made for the isolation of contacts.

Housing for the poor and other sanitary measures should be continued; but though large sums will be spent in providing better comfort for the poor it will take centuries to reach perfection, and meanwhile will not save the country from the ravages of the disease unless complete isolation is enforced. Immediate isolation of all tuberculous patients, far away from the haunts of man, is the only remedy. Every province should have its one and only centre. Every patient, whether man, woman or child, should be immediately sent away to the institution, and every suspected case placed under observation, in a place reserved for such cases outside the town, and transferred to the chief centre as soon as the disease is confirmed. The place chosen for the chief isolation institution should not be too easy of access, as free communication must be avoided. It is only by severe and drastic measures that any degree of control will be effected. The people in this tuberculosis home will soon adapt themselves to the new life. Friendships will be formed and amusements and other interests appear and the desire for communication with the outer world will gradually wane and die. There are many places in India, and several in the Punjab, which would be ideal spots for these homes. In the Kangra District, Outer Seraj appears to be an ideal place. It has the desired amenities, water is in abundance and it is sufficiently inaccessible. This part of the country has a vast area and is very thinly populated. Its altitude varies from 3 to 10,000 feet and it is rich in pines and deodars, and it is completely barred on the Kulu-Kangra side by the Bashleo and Jalourie passes. It is also many miles away from Simla.

Of course it is not possible for any government to undertake such a colossal task, but government should help in granting facilities, the most important being free land on a long lease and cheap timber from the forests. Labour is cheap and therefore the rich and middle classes should be induced to build their own cottages on approved lines, and the poor should receive their share of help. The rich have doled out their wealth in the past and there is no reason why they would not continue to show the same sense of public duty if approached in the right spirit. The "home" once started will grow in popularity as all other similar institutions have done. The rule should be for patients, when once sent there, to remain there *always*. They will soon adapt themselves to the surroundings and small industries may grow up and flourish. The part of the country known as Inner Seraj will become equally popular if parents and relatives are permitted to reside in this locality. They will be sufficiently away from the infected area and at the same time within easy reach of the "home." Transportation of advanced cases will be difficult, though not impossible, but in time only incipient cases will have to be dealt with. The journey, by motor through the Kangra Valley and by easy stages for the rest of the way, will be pleasant, and a novelty also.

A SCHEME FOR CARRYING OUT A TUBERCULOSIS SURVEY WITH A VIEW TO THE PREVENTION OF THE DISEASE IN A LOCALITY.

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Introduction.—A person who is tuberculous does not necessarily suffer from tuberculous disease. On the other hand, tuberculous disease cannot occur without a tuberculous infection at first. Tuberculosis is therefore different from tuberculous disease. To have tuberculosis is to have a relative protection against the development of tuberculous disease.

So far as human beings are concerned there are two main sources of tuberculous infection. These are human and bovine; the human source is through infected sputum, urine, fæces and other discharges from the body, but is mainly through infected sputum, and the bovine source is through infected milk.

The object of the scheme that I give below is the eradication or at least the control of tuberculosis. The scheme essentially consists of three parts, and I will discuss each part separately.

The first part of the scheme consists in the detection of actual sufferers from tuberculosis. For this, correct and early diagnosis of all who are or are supposed to be ill with the disease is most essential. The symptomatology, the clinical, bacteriological, and radiological examinations, etc., will help us to arrive at a correct diagnosis. The cases thus diagnosed will be classified under two groups, *viz.*, pulmonary, and non-pulmonary. Pulmonary cases of tuberculosis will be classified into three types, young adult type, adult type, and old age type of phthisis. Non-pulmonary cases of tuberculosis will be classified into glandular, genito-urinary, intestinal, bone and joint, skin, etc., tuberculosis. These two groups of tuberculosis cases will also be shown by communities and sexes under different age groups.

For bacteriological examination of sputum, urine, fæces, pleural fluids, blood, etc., laboratory facilities will be needed. In order to obtain co-operation of the general practitioners of the locality in this work of diagnosis of cases, I propose that the bacteriological examination of materials from patients suffering, or supposed to be suffering, from tuberculosis should be done free of charge. Of course the diagnosis of these cases will be kept strictly confidential. So far as treatment of the cases is concerned efforts will be made as far as possible to treat their symptoms, and to secure suitable treatment for them in hospitals and sanatoria where accommodation is available and where special treatment is being given. The treatment part of the work will not form a part of the scheme of work but will be carried out without interference with the survey work. So, under this part of the scheme, we shall not only find out the total number of cases of tuberculosis, classified into their groups and sub-groups, but we shall also know how many are "tubercle bacillus positive" and how many are not.

The second part of the scheme is purely preventive work. This consists in noting the nature of the environment in which tuberculosis is contracted. When this is known the conditions responsible for the onset of the disease can be dealt with, and consequently its incidence reduced to a minimum. At first a map of the locality showing the streets, lanes, open spaces, gardens, public buildings, sanitary installations, etc., will be prepared. Attention will then be directed to find out:—

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(1) If there is any overcrowding in the locality under survey in general, and in the infected houses in particular, by measuring the cubic space in the living rooms per head in each house.

(2) If the ventilation and lighting arrangements in each house are sufficient and give access to direct sunlight in the living rooms some time during the day.

(3) If the income of the residents in general, and of the inmates of the infected houses in particular, is enough to maintain themselves, and, if so, whether the income is stable or not. Investigations will also be made regarding any economic stress, as for example that caused by the high price of wheat or of milk and its products, and whether wheat and milk of good quality are available in sufficient quantity to meet the requirements of the residents of the locality.

(4) If the open spaces and arrangements of the streets and lanes is such as to secure an adequate aeration of the locality.

(5) If there are any dusty occupations or other trades which augment the onset of the disease in the workers engaged therein.

(6) If there are any other conditions, such as defective drainage and the height of ground water, which favour the breeding of mosquitoes and so debilitate and predispose the residents to an attack of tuberculous disease.

(7) And, lastly, if there are any social customs, such as the *purdah* system, food and drink habits, which affect the incidence of tuberculous diseases.

Other work under this part of the scheme will be tuberculin testing of all the residents and cattle, except those who are ill with the disease. From this the extent of tuberculous infection amongst human beings and the cattle in the locality under survey will be found out. Under part one of the scheme we have found the total number of cases and here we shall find out the number of tuberculous persons. So by adding these two numbers, and subtracting the sum from the total population, we shall find out the number of unprotected persons. This number constitutes what is known as "virgin soil" for the tubercle bacillus.

Now it will be our duty either to protect these unprotected persons, the so-called "virgin soil," with B. C. G. (*i.e.*, Bacille Calmette-Guerin), or to transfer them to places where there is no danger of their being charged with a heavy dose of tubercle bacilli. This is done in the case of infants born of tuberculous patients either by their immediate removal after birth to safer places, or by immunization with the B. C. G.

Other measures to reduce the incidence of the disease are to treat and remove positive cases from the locality and to build up the resistance of the residents living therein by changing their environment, so that they have a minimum chance of falling a prey to tuberculous diseases.

To do this would require great labour, patience and a very large sum of money. To begin with I think legislation should be passed to make all tuberculous diseases notifiable, and to prohibit spitting in public places; also laws and bye-laws should be made regarding the construction and sites of buildings. With this, efforts should be made to raise the wages of the bread-winners, or provision made for the supply at cheap rates to them of the bare necessaries of life. Efforts should also be made to change the dark ill-ventilated houses into airy and sunny dwelling places, to improve the sanitary condition of the locality so that it, by itself, has no debilitating effect on the health of the residents, and lastly to widen the streets and lanes, and to provide open spaces. Along with these efforts of course will come the question of building tuberculosis dispensaries, hospitals and suitable sanatoria for the diagnosis, care and treatment of the sick. After this, the work of forming health-care committees can be taken in hand, the object of health-care committees being to take care of the dependents of the patients removed to the institutions and to secure suitable work for those who return from these institutions as arrested and improved cases of tuberculosis. Last of all will come the question of colonization of those cases who are capable of earning a livelihood for themselves and their dependents under medically controlled conditions.

In order to minimise the source of infection through milk, people should be advised to take only boiled milk. Legislation should be passed to allow the sale of "tuberculin-tested" milk only. The system of immediate separation of calves born of tuberculin reactors, and of bringing them up as clean herds should be adopted, and if necessary tuberculin reactors should be killed and compensation paid to the owners, as is being done now in Scotland.

Part three of the scheme consists purely of propaganda work by means of posters, leaflets, and simple talks and lectures, illustrated by magic lantern slides, on preventive aspects of tuberculosis, in schools, in public institutions, and in the infected houses. The approximate cost of special posters and magic lantern slides on tuberculosis will be Rs. 350. Aid in propaganda work, as well as in the removal of customs which are injurious to the health, will be invited from the Christian missionaries, from indigenous social and religious societies, and from heads of local educational institutions.

The daily routine to carry out this scheme for tuberculosis survey will be 6 hours' work as under:—

9 a.m. to 12 noon.	Examination of patients, their contacts and others.
1 p.m. to 4 p.m.	Laboratory work, tuberculin testing of human beings, visiting of houses, propaganda and office work.

Special propaganda work will be done occasionally in addition to this daily routine. The period required to complete this survey in a locality with a population of 2,000 and 400 houses will be six months.

Staff.—The following staff is the minimum that will be needed for carrying out the survey:—

(1) One sanitary inspector.
(2) One lady health visitor, or a trained nurse.
(3) One dispenser.
(4) One peon.
(5) One combined sweeper and a chaukidar.

The veterinary assistant of the locality will do the tuberculin testing of cattle, a list of which will be prepared beforehand.

Accommodation.—Three well-lighted and well-ventilated rooms will be needed, one to serve as a waiting room for the patients and their attendants, one as an examination room, and the third to be used as a laboratory and for office work. In addition to this one room will be needed for the chaukidar, who would stay on the premises. The place rented will be designated the tuberculosis dispensary.

Articles.—Besides the necessary articles of furniture for the dispensary and a bed for the examination of the cases, the following articles will be required:—

(1) One microscope.
(2) Complete staining equipment for the staining of the sputum, urine, fæces, blood, etc.
(3) One hundred sputum bottles and one hundred sputum cups for supplying to the patients for collection and disposal of sputum.
(4) A few medicines, such as tonics, laxatives, and cough mixtures.
(5) Other articles, such as clinical thermometers, a few instruments, and stationery, including a register for outdoor patients.

Cost.—The approximate cost to carry out this scheme would be Rs. 2,000, or £150.

A PSYCHIATRIC TOUR OF EUROPE.

By BANARSI DAS, M.B., B.S., D.P.M. (Eng.), P.M.S.,
Civil Surgeon, Hardoi, U. P.

THROUGH the generosity of the United Provinces Government I undertook a tour of visits to some of the important mental institutions of Europe in the first quarter of 1931.

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In London the Bethlem Royal Hospital has just moved into palatial buildings with extensive grounds at Eden Park, 30 minutes' run from the heart of the town. The design of the buildings, the general layout, and the wonderful equipment are all on the most up-to-date lines. I passed through Cowley, the home of the famous Morris cars, on my way to Littlemore to see the Oxford Mental Hospital. This hospital has the singular good fortune of having as its medical superintendent a psychiatrist of unbounded enthusiasm, who has served the same institution for over 25 years and has successfully transformed an old building for the safe custody of lunatics into a modern mental hospital with practically no signs of restraint visible anywhere. Dr. Saxty Good's magnetic personality is reflected in every detail of the work at this hospital. The temperature of the therapeutic bath is controlled by the blood pressure in each case. His nurses receive an exceptionally sound training. At Edinburgh I visited Craig House, Morningside, where only paying patients are admitted under Prof. Robertson. I found my visit to Bangor village, about 16 miles by road from Edinburgh, particularly instructive. At Bangor they seem to specialize in a keen hunt for septic foci, and they demonstrate good results in different kinds of psychoses following the dental surgeon's attack on pyorrhœa and root abscesses.

At Cardiff biochemical research is to the fore. The buildings are modern and great emphasis is laid on early treatment in the out-patients clinic attached to the general hospital of the University. The institution for mental defectives at Colchester was the only one of its kind that I could see. While I was full of admiration for the great care bestowed on its unfortunate inmates, yet when I passed through the hopelessly-defective-infants' ward I could not but wonder if the eugenist's remedy might not be of greater service to society than the efforts of the medical profession.

In Holland I began with the newly opened psychiatric clinic at the Hague and was also shown over the large ancient Ziekenhaus at Sant Poort. Here I observed the method of handling restless patients, which is associated with the name of Dr. Simon of Güterslo. The main feature of this method is that direct restraint is not used. Each patient is given something to do. Any form of manual labour will do, such as wood-work, knitting, sewing, book binding. While all the cases are in one room under the observant eye of nurses the more restless ones are, relatively speaking, isolated from others by being hemmed in with tables, benches and other articles of furniture in different parts of the same room. I was surprised to see how little noise they made while busy with their fingers. The moment any one becomes noisy he is not allowed to disturb others but is promptly removed to a separate room opening out of the work room. He generally quietens down at once and can come back in a few minutes, but goes out again and again if he misbehaves. If the misbehaviour is repeated too often he is dealt with otherwise; but this is exceptional. Both at the Hague and at Den Dolder, near Utrecht, which I visited next, I realized what a great advance had been made in the care of the insane in a small country like Holland. At Den Dolder the director is a thorough-going Freudian in his methods and outlook on mental disease. His large hospital is set in beautiful woodlands and further extension of the buildings on modern lines is nearly complete. A large number of patients have found useful employment in the building operations. Dr. J. H. Pameijer, the Government Inspector of the Insane, very kindly acted as my guide, philosopher and friend in his charming country of dykes and windmills, and, I should add, bicycles. I have never seen so many bicycles *en masse* anywhere.

From Holland I went further north to Hamburg. I arrived at the door of Prof. Weygandt's famous clinic without any credentials. In my broken German I explained to the hall porter that I was a medical man from far-off India and was interested in psychiatry. I asked him to 'phone to the director and enquire if an English-speaking doctor was available to show me over the clinic. To my surprise the reply came that the director himself spoke English and would be pleased to see me at once. A further surprise was in store for me on arrival before the director when I found that not only had he studied Sanskrit but was also well posted on Indian affairs. He gave up a good deal of his valuable time in personally conducting me through his wonderful museum of brains and skulls, of not only all living and extinct races of man, but also of every animal from the smallest to the biggest. Then he deputed one of his assistants to take me over the hospital and laboratories. As this was the first German clinic I visited I was much impressed by their thoroughness and attention to detail. This impression became still deeper after seeing their methods in Berlin and Münich. Prof. Weygandt placed me under a special debt of gratitude by giving me letters of introduction to the directors of the psychiatric clinics at Berlin, Vienna, Münich and Paris. At Berlin my guide was rather handicapped for want of time and we just had to rush through. I noticed electric therapy and hydrotherapy in progress. One special feature of this clinic is that they mix up mental and neurological cases indiscriminately in the wards.

At Vienna who can fail to be impressed by a visit to the wards in which Prof. Wagner Jauregg worked out the malaria therapy of general paralysis of the insane? But the rope netting round the beds of restless patients jars on one's finer feelings specially after seeing the results of the no-restraint policy at Oxford and other English hospitals. Prof. Economo, the discoverer of epidemic encephalitis, kindly showed me the new institute for brain research. I saw perfect permanent casts of brains being made with some secret composition imported from Switzerland. I called at the headquarters of the American Medical Association, which caters in many ways for English-speaking physicians. But it offers no special advantage to an alienist with a working knowledge of the German language.

The Psychiatrische Klinik of Münich is particularly strong on the laboratory side. I saw post-graduates of many nationalities doing research work in its well-equipped laboratories. Both the biochemical reactions and physical changes in mental disorders receive thorough attention. In Germany there seem to be no cramping restrictions about holding post-mortem examinations practically immediately after death on almost any case, and research goes on unhampered. In England, on the other hand, a post-mortem examination cannot be held for at least 24 hours* after telegraphing the news of death to the relatives. Even a delay of 24 hours makes a world of difference to the morbid changes in the nervous system composed of the most delicate tissue in the whole body.

At Paris my total ignorance of French proved a great handicap. But the English-speaking secretary of Dr. Toulouse kindly acted as interpreter. Full size artistic statues adorn the wards and passages, and all parts have been profusely decorated with mural paintings by patients. Apparently the French temperament finds special solace in art, even when reason is clouded. The preventive side has received much attention. The headquarters of the French National Council for Mental Hygiene are located at the clinic, and the next International Congress has been invited to hold its sittings in France in 1932.

I wish specially to thank Dr. A. E. Evans, Commissioner of the Board of Control, London, for invaluable help in planning this tour and the heads of all the institutions visited for their warm welcome and uniform courtesy.

* This difficulty can, however, be overcome by obtaining the consent of the relatives when the patient is admitted. As this is obtained in about 80 per cent. of cases, the practical difficulty disappears and immediate post-mortem is the rule in most British asylums.—EDITOR, *I. M. G.*

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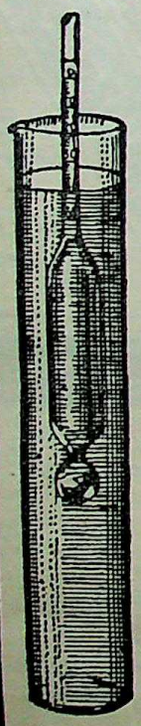

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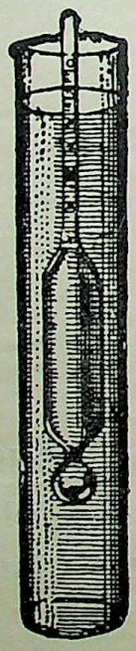

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Indian Medical Gazette.

SEPTEMBER.

THE QUININE POLICY.

WHATEVER other means of malaria eradication, prevention and treatment are practised in this country, our mainstay in the fight against this disease is at present, and probably will be for many years to come, the cinchona alkaloids. It has been repeatedly stated, and there is no reason to believe that the figure is an over-estimate, that there are 100,000,000 sufferers from malaria in India. Of these not 10 per cent. receive any specific treatment whatsoever. There are two causes of this very unsatisfactory state of affairs: the first is the shortage of the cinchona alkaloids in this country and the second is our failure to get such supplies as exist to the people that require them.

Numerous estimates have been made of the quinine requirements of India, but at the very lowest estimate they can be placed at 1,000,000 pounds *per annum*. The supply is obtained from two sources: manufacture within the country and importation. The only internal manufacture that need be considered is that in the two state-owned factories, at Mungpoo in Bengal and at Neduvattam in Madras. The combined output of these two factories does not amount to 70,000 pounds *per annum*, that is to say it is one-fourteenth of India's minimum requirements. Associated with these two factories are state-owned cinchona plantations; there are in addition some plantations in Burmah which have not been a great success, and a few privately-owned plantations in the Nilgiris. These privately-owned plantations were at one time an important source of supply of bark, but either from lack of enterprise on the part of the owners who have allowed their plantations to be 'milked dry,' or from some other cause, there is very little of this bark available in the open market, and what there is, is of very poor quality. India's consumption of quinine during 1927-28 and 1928-29, the years for which figures are available, was about 200,000 pounds *per annum*. Thus, two-thirds of India's annual consumption, which is only one-fifth of her minimum requirements, has to be made up by importation.

A considerable amount of criticism has been aimed at the Government of India's quinine policy. It has been said that they are deliberately maintaining the price of quinine at a high level for the benefit of the Kina Bureau, the powerful Dutch combine which has so complete a monopoly of the world supplies of quinine that it is able to dictate to the world the price at which quinine shall be sold; in 1926 the price was fixed at approximately Rs. 18 a pound. The facts are, of course, far otherwise; even if the Government of India decided to sell all their quinine at the cost of production, the supply would be bought up at once and the world price of quinine would promptly return to the old level, but as at present they have to purchase from outside almost twice as much as India can manufacture they are in no position to dictate to, or even to bargain with, the Kina Bureau. In answer to this defence of Government policy the critics say, 'Then why do the Government not manufacture more quinine, instead of allowing large quantities of bark to be exported each year?' The main reason why Government do not manufacture more quinine is that they haven't the bark from which to manufacture it. These large quantities of cinchona bark which are supposed to be exported each year are apparently a pure myth. Government not only purchase all the stocks of good bark available in India but actually import bark from Java. We have been informed on good authority that less than 50,000 pounds (not 6,000,000 pounds as has been stated) of bark are exported, and that this is of very poor quality, unsuitable for quinine manufacture. Lastly, the critics will say, 'Then why do not Government extend their cinchona plantations?' Here they are on much surer ground. The policy of Government in the past has not been a very far-sighted or vigorous one, but at the same time they have not entirely closed their eyes either to the necessity or to the possibility of India producing her own quinine requirements. Plantations were started in Burmah not very long ago; they have not been as productive as was at one time hoped, but when the difficulties have been overcome it is possible that they will provide a considerable internal (if Burmah has not meanwhile been separated from India) source of cinchona bark. This question of the extension of the production of cinchona in India is a point to which we shall return presently.

Let us turn for the moment to the other side of the problem, namely the distribution of the supplies of quinine which are available. Both the home production and the foreign purchase of quinine are controlled by the Government of India; they cannot, however, themselves distribute the quinine; medical relief being a transferred subject this is a matter for the provincial governments. Quinine is supplied to the provincial governments at Rs. 18 a pound; the latter purchase as much quinine as they can afford, but at this price they cannot afford to purchase nearly as much as they would like, and charges have been made against the Government of India of profiteering in this connection. Reference to the last report of the Government Cinchona Plantations and Factory in Bengal shows that the cost of quinine at the factory door is Rs. 7.55 a pound. This figure probably does not include all the administrative charges and certainly not the interest on capital outlay. If these two items

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are added the cost would probably amount to over Rs. 10 per pound. We have no figures for the other factory, but we understand that in this the cost is greater. Then it must be remembered that the balance of India's requirements has to be purchased from abroad; these purchases presumably have to be made at the standard price of Rs. 18, so that it will be seen that the profit to the Government on internal sales is not very great. Nevertheless, it is hard to justify any profit at all in a transaction which is of such vital import to the health of the masses.

Despite the very great need for quinine all over India it appears that during the last year or so there has been a considerable decrease in the demands of local governments—presumably on account of shortage of funds—and that in consequence the Government of India have accumulated large stocks. Their present trouble is not a shortage but a large stock which impoverished local governments cannot afford to purchase but which the Public Accounts Committee is urging them to dispose of. Government have for the time being terminated their contracts for foreign purchase of quinine, but they cannot compel the local governments to buy. A suggestion has been made that if the Government of India would reduce the price local governments would be willing to purchase more freely, but apparently there are tiresome sections of the Government of India Act, known as the Devolution Rules, which prevent them from favouring any one province by selling the quinine to it at less than cost price. The position seems to be an absurd one; the Government of India have the quinine and want the money for it; the provinces want the quinine and would be willing to pay a reasonable price for it; but the Finance Department flourishes the Devolution Rules, the Government of India sit on their quinine, the local governments spend on other measures the money they had put aside for the purchase of quinine, and the *ryot* continues to shake with ague. To the doctor who knows the conditions in the malaria-infected areas in Bengal and Assam it seems to be a case of criminal blundering, and even to the business man who does not understand the niceties of governmental procedure the position is incomprehensible; he would write down the value of his stock and sell at the best price he could get, rather than allow his capital to lie fallow. However, it is possible that in time a means may be found to circumvent the Devolution Rules and to fix a price which will appeal to the local governments.

Even then the real problem has still to be faced, namely, how to get the quinine to the malaria patients. Free distribution, except in hospitals and dispensaries and even in these abuses are far from unknown, has not been a success. Quinine being valuable and human nature being what it is the drug seldom gets to the indigent *ryots*, the people for whom it is intended. Even when it does reach them, they are liable not to value a thing for which they do not pay, and to be suspicious of any apparently benevolent act of a government which they are not always taught to respect. When in one province quinine was retailed below the market rate it was purchased in large quantities and sold again at an enhanced price in a neighbouring province. The present post-office quinine packets do not seem to appeal to the people, partly on account of the price, which does not compare favourably with the *bazar* price, but mainly we imagine on account of the very unattractive packing in which it is sold. Then there is the inborn prejudice of the uneducated ryot against 'western' medicine. This is of course fostered by the indigenous *vaidyas* and *hakeems* who, whilst knowing its value and giving it in their own mixtures under a different name, preach that quinine causes impotence and sterility. The prejudice can only be overcome by extensive health propaganda which again the provincial governments say they cannot afford, in their present impoverished state, to extend.

If the Government of India could be induced, or shall we say, would square their conscience sufficiently, to sell quinine at a price that would make it possible to put up the quinine in attractive packages or bottles which would compare favourably in appearance with the commercial article, and to distribute it retail at its minimum wholesale price, a step towards the solution of the immediate problem would have been made. In these days when governments are poor there is an opportunity for the better educated Indians to come forward, not with monetary assistance, as they are as poor as their governments, but with assistance in the dissemination of useful propaganda. The Government could provide attractive posters to be placed outside post-offices and in schools, and possibly print hand-bills in the vernacular, but village health organisations should be formed to assist in the proper distribution of these hand-bills.

Let us assume that such a plan is possible, that it has been put into effect and that it has been successful, that is to say that it has led to a very much more extensive use of quinine by the people who require it. The present excess quinine stocks would rapidly be exhausted and the Government would again have to purchase extensively from outside at a higher rate than they were selling it at; so, with the possible exception that some of the people will have acquired the quinine habit and be willing to pay more for the drug rather than do without it, we have now come round to where we were before.

Until now we have been talking of quinine as if it were the only cinchona alkaloid which will cure malaria. It is the one that has

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hitherto been used most extensively, but it is not the only alkaloid of recognised value in the treatment of this disease; we know that both quinidine and cinchonidine are equally, if not more, efficacious. *Cinchona ledgeriana*, the plant from which the highest percentage of quinine can be obtained, grows very well in Java but it is a relatively weak plant and will only grow in India under the optimum conditions; this means that the plantation areas suitable for this plant are limited. On the other hand there are plants, *Cinchona succirubra* and *Cinchona officinalis*, and their hybrid, *Cinchona robusta*, which will grow well within a much wider climatic range: these plants, though not economically suitable for quinine production, as they provide a much smaller percentage of this alkaloid, provide almost as high a percentage of total alkaloids. In the last annual report of the Government Cinchona Plantations and Factory in Bengal, Mr. C. C. Calder remarks, 'We cannot get away from the fact that quinine is the rich man's remedy ....; but let medicine admit and practise the value of the other alkaloids and many Indian areas might be turning out febrifuge at costs more suited to the poor.' A cinchona febrifuge* is prepared by precipitating the total alkaloids of cinchona bark, that is to say, quinine, cinchonidine, quinidine, cinchonine and certain other less important alkaloids. The further separation of the several alkaloids is an expensive matter and accounts partly for the high cost of the pure alkaloids. All these alkaloids have an action on the malarial parasite and therefore cinchona febrifuge should be as efficacious in the treatment of malaria as the pure alkaloid quinine, and not only could it be produced in much larger quantities in India, but its cost would be very considerably less, both on account of the easier production of the bark and the easier extraction.

A certain amount of experimental work has been done on the various cinchona alkaloids in relation to the treatment of malaria. The recent work at the Calcutta School of Tropical Medicine, and that of Fletcher at Kuala Lumpur has shown the value of the alkaloids other than quinine.

Cinchona febrifuge has been used as a routine treatment in the out-patient department of the Calcutta School and in the Carmichael Hospital for Tropical Diseases for some time, special cases only being put on quinine, and when prescribed in a mixture the febrifuge has been found to give extremely satisfactory results.

There are certain objections to the substitution of cinchona febrifuge for quinine; the most serious of these is that its composition varies. In order to standardise it so that it has always the same composition, the various alkaloids would have to be separated and then again mixed; this would bring up the cost of production to that of quinine. This is a serious objection, but it is not necessarily a vital one. We imagine that the composition of the extract from a single crop of bark from one kind of plant in one locality does not vary very considerably; the composition could be estimated at a practically negligible cost; and then by suitable mixing could be brought to an approximate standard. Furthermore, dosage in malaria is not worked down to such a fine margin that small variations need be considered seriously; it would at least be better for a patient to get 75 per cent. of the dose prescribed than no drug at all.

There is a certain amount of prejudice against cinchona febrifuge because the tablets, the form in which it is often distributed, are very hard and insoluble; consequently the drug is not absorbed and no benefit is conferred. This insolubility is apparently due to certain resinous substances which are precipitated with the alkaloids. It should not be difficult to separate these substances and prepare a more soluble tablet. Finally, in a small percentage of cases the cinchonine produces vomiting, but here again it is probable that some means, that would not add appreciably to the cost of the product, could be found for removing this alkaloid whenever it occurs in excess.

The refined alkaloid quinine is at present an expensive luxury; there seem to be no immediate prospects of making it available in the quantity or at the price to meet India's *real* requirements. The present surplus of quinine in India is due to the complete failure of the present distribution policy, and again this failure is in part due to the prohibitive price of quinine. Efforts are being made to overcome the distribution problem and there is some prospect of improvement in this direction, but the more successful the distribution policy, the more acute will become the production problem. The production difficulty will inevitably react on the distribution policy, and progress will be slow, even if it does not altogether cease.

Fortunately, there is no reason to believe that this refined alkaloid is the only, or even the best, drug for malaria, and there is every indication that a scientifically prepared febrifuge consisting of the total alkaloids is equally efficacious. We believe that in time India could produce sufficient cinchona febrifuge to meet her own requirements and at a cost which would considerably facilitate the distribution problem. It is useless for the Government to embark on a policy of extensive cinchona-febrifuge production unless there is a reasonable prospect that the drug will be used and unless there is hearty co-operation on the part of the medical profession. The refusal of members of the medical profession to see the

*This term appears to be used rather loosely, as indicating either the total alkaloids or the total alkaloids from which most of the quinine has been extracted; the term is used here in the former sense.

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possibilities and advantages in prescribing cinchona febrifuge has been, and is, the greatest stumbling block in the way of the adoption of some progressive policy. They again have possibly not been served as well as they might have been. One cannot blame them for hesitating to prescribe the rock-like cinchona-febrifuge tablet which is destined to become an enterolith, or, as anything but emetics, some of the 'febrifuge' mixtures made from the residue of the cinchona alkaloids from which all the quinine has been extracted and in which an excess of cinchonine is left.

Thus, there is still work for the quinologist, the pharmacologist and the medical research worker. The subject is one not of merely academic interest, but of vital national importance, and it has not received the attention it deserves from the organisations which could deal with it. There may be a very definite flaw in the policy we have suggested; if this is so, and there is some reason why the total alkaloids of cinchona cannot be used as a satisfactory substitute for quinine, then the belief that they can is a fallacy which has been steadily gaining ground for some years and definite steps should certainly be taken to expose it as such. On the other hand if a satisfactory 'standard' cinchona febrifuge *can* be prepared, a greater effort must be made to educate first of all the medical profession and then the general public to use it. Then, and not till then, will it be possible for the Government of India to adopt a definite policy with regard to their cinchona plantations.

Some little time after writing the above the first volume of the *Indian Medical Gazette* came into our hands. In the May number of this volume we found an editorial on 'Cinchona febrifuge.' The following is an extract from the concluding paragraph of this editorial, written a little more than *65 years ago*.

"But the enquiry into the medicinal efficacy of Cinchonidine, Quinidine, and Cinchonine, apart from its professional importance, is one of wide and general interest; for it bears very materially upon the extent of the success of Cinchona cultivation in India. If these principles prove to be, as supposed, even *nearly* as efficacious as Quinine, the value of the high percentage of alkaloids in the Neilgherry Cinchonas will be considerably enhanced. If, on the other hand, their medicinal action is found to be much inferior, the commercial importance of these Cinchonas will necessarily diminish in proportion. The Medical Officers engaged in this enquiry need hardly therefore be reminded how great a trust is reposed in their hands; upon their verdict will depend the settlement of an important medical and commercial question."

TUBERCULOSIS SCHEMES.

Two suggestions for dealing with the tuberculosis problem in India have been sent to us and will be found published as special articles in this number.

How serious this problem is in India, it is difficult to say. There is no doubt whatever that in the large towns the mortality from tuberculosis is high, and there are indications that it is increasing. On the other hand official returns from the rural areas suggest that, compared with other diseases, it is almost a negligible factor as a cause of death. There is however some doubt about the reliability of these reports, and in some of the Mohammedan districts in Bengal the disease is said to be rife, particularly amongst the *purdah* women.

At any rate as far as the towns are concerned the problem is a serious one, though we are not inclined to the view—so rhetorically expressed—of our contributor from Dharmsala that India's existence as a nation depends entirely on the adoption of drastic measures to deal with this scourge, and it is encouraging that many of the movements designed to deal with it have been started, these mainly by Indians.

With the spirit of his clarion call and with his suggestion that the first steps should be taken by philanthropists, government only being asked to provide land and presumably legislation, we are in entire sympathy, but we cannot agree with many of Dr. McGuire's statements, especially those on sanatoria,* and we are somewhat doubtful about the efficacy, and entirely sceptical about the practicability, of the plan he recommends. The suggestion that all sufferers from tuberculosis should be isolated has been made many times before, but in no country has the plan ever been seriously attempted. Even the attempts made by Australia to keep phthisical persons from entering the country have not been conspicuously successful.

There is something very naïve about his suggestion that, "Every tuberculous patient, whether in town or village, should be traced and removed for isolation, and arrangements should also be made for the isolation of contacts." We should like to ask, "What constitutes a *tuberculous patient?*" and "Who are *not* contacts?" Finally, we do not think that, however attractive the surroundings in the spot he has chosen for his tuberculosis "home from home," the inmates' desires for communication with relatives and friends "would gradually wane and die," nor do we feel that even the pleasant and novel journey through the Kangra valley would compensate them for life-long isolation.

Our second contributor appears to have a much better understanding of the problem. He will find that there will be opposition in some quarters to his plan for the extensive use of B. C. G.; otherwise his suggestions are sound, though very definitely idealistic. His recommendation that "efforts should be made to raise the wages of the bread-winners.....to change the dark, ill-ventilated houses into airy

* We draw our readers' attention to Dr. C. Frimodt-Möller's paper on the after-histories of sanatorium patients; the paper provides a complete refutation to many of Dr. McGuire's strictures on the sanatorium system in India.

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and sunny dwelling places,.....and lastly to widen streets and lanes, and to provide open spaces" is excellent in its way but not perhaps very practical.

Lastly, his estimate of Rs. 2,000 for carrying out his scheme, even if this sum is not meant to cover the extensive social reforms he suggests, is distinctly optimistic.

On the whole we are inclined to think that neither of these schemes is the final solution of the tuberculosis problem in India.

Medical News.

ASSAM MEDICAL COUNCIL.

Members elected.

IN pursuance of rule 17 of the rules made under clause (a) sub-section (2) of section 33 of the Assam Medical Act, 1916, the under-mentioned doctors have been elected as members of the Assam Medical Council for a term of three years with effect from the 11th June, 1931.

1. Dr. H. Lyngdoh, L.M.S., Shillong.
2. " Paresh Chandra Guha, L.M.S., Shillong.
3. " Sarat Chandra Chakraborty, L.M.F., Silchar.
4. " Kedar Nath Ghose, L.M.P., Moulvibazar.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

Instruction in Tropical Medicine and Hygiene.

AN important announcement is made by the authorities of the London School of Hygiene and Tropical Medicine in regard to the future post-graduate courses of study in tropical medicine and hygiene. The five-months' course of intensive study hitherto in force, followed by examinations, first for the school certificate and then for the diploma of the Conjoint Board of the Royal Colleges of Physicians and Surgeons, has been found to impose an undue strain upon candidates. In addition, many of the colonial governments have found it difficult to release their officers for a sufficiently long period to enable them to combine what is in effect six-months' study leave with a much-needed holiday in England. Further, the requirements of the Colonial Service have been repeatedly of so urgent a character that for recruits about to proceed overseas there has been a demand for a shorter course of instruction than has hitherto been possible under the arrangements made by the London School.

The whole situation has now been reviewed and, after consultation with the Colonial Office and the Conjoint Board, the School authorities have divided the course of study into two parts: section A—a three-months' course of clinical and laboratory instruction, and section B—a two-months' course in tropical hygiene. Each section has been so designed that it can be taken independently of the other, and the Conjoint Board are arranging for the dates of the examinations to follow closely upon the end of the corresponding course of study.

The examinations for the school certificate will be discontinued, and students will be encouraged to sit for the diploma examination held by the Conjoint Board—the D.T.M.&H. (Eng.). Application has been made to the University of London for recognition of the revised course of study as a recognised course for associate students, and every student at the School, whether sitting for the diploma examination or not, will be entitled to apply to the University for a certificate of attendance at the recognised course of study.

The dates of the courses for the session 1931-32 are as follows:—

Section A.
(Clinical and Laboratory Instruction.)

1st course: 29th September—18th December, 1931.
2nd course: 4th January—24th March, 1932.
3rd course: 11th April—30th June, 1932.

Section B.
(Tropical Hygiene.)

1st course: 18th January—18th March, 1932.
2nd course: 18th April—17th June, 1932.

The course of instruction under section A includes clinical tropical medicine, applied pathology, medical zoology and elementary bacteriology. Section B comprises instruction in tropical hygiene including, in relation to hygiene, bacteriology, medical zoology, anthropology, and vital and medical statistics.

Not the least interesting development in connection with the revised course of study is the establishment within the London School of Hygiene and Tropical Medicine of a new Division of Clinical Tropical Medicine, of which Dr. G. Carmichael Low will be the first Director and Dr. P. Manson-Bahr Deputy Director. The whole of the instruction in this subject will be given in the new Division by the medical staff of the Hospital for Tropical Diseases and by visiting lecturers. In this way the splendid resources of the hospitals of the Seamen's Hospital Society at Endsleigh Gardens, at the Albert Docks, and elsewhere, become available for the clinical instruction of the students at the School. For their co-operation in this matter the School is greatly indebted to the Seamen's Hospital Society. The whole of the revised arrangements mark a development in the teaching of tropical medicine and hygiene for which the Dean of the School, Professor W. W. Jameson, and his colleagues are much to be congratulated.

It is also announced that the course of study at the School for the University of London Diploma in Public Health has been revised so that the period of study is now covered by nine-months' whole-time work. A further interesting development is the establishment in the School of a University Chair of Medical Industrial Psychology with Professor Millais Culpin as its first occupant.

The course of study for the D.T.M.&H. and the revised course for the D.P.H., as well as the course for the Diploma in Bacteriology and other special courses, all commence at the end of September or the beginning of October. All inquiries should be addressed to the Secretary of the School at Keppel Street, Gower Street, W.C. 1.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

EXAMINATION RESULT. 90TH TERM.
FEBRUARY—JULY 1931.

Passed with distinction.

McClelland, H. W. H. (Winner of "Duncan" Medal).
Burnett, W. A.
Howat, C. H.
Rosset, J. A.
Vardy, E. C.

Passed.

Adderley, E. S.
Barnett, E. E.
Bowles, R. V.
Brandwood, R. N.
Brink, C. J. H.
Caldera, R.
Chaudhuri, H. P.
Cronyn, H. D.
Das, B. R.
Edmundson, K.
Johnson, A. J.
Khambatta, F. B.
Langan, T.
Moore, S. H.
Morris, E.
Nicklin, R.
O'Shaughnessy, P. J.
Papadakis, A.
Perumal, N. C. R. M.
Potter, P. B. Lee.
Razdan, J. L.
Rosset, O.
Sivalingam, V.
Steyn, M. H.
Syddiq, M. M.
Taylor, J.
Unnithan, P. G. G.
van Cuijlenburg, R. W.
Vardy, E. C.
Viapree, F. A.
Wiles, L. A. F.
Williams, A. W.

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Current Topics.

The Treatment of Gastric and Duodenal Ulcer. (A Statistical Inquiry.)

By A. R. SHORT, M.D., B.S., F.R.C.S.

(Abstracted from the *British Medical Journal*, 14th March, 1931, p. 435.)

IT is useless to discuss the prognosis and end-results of the treatment of these ailments unless there is a clear understanding of what we mean by the terms in question. There was a time, up to, shall we say, 1910, when it was generally supposed that a patient with hæmatemesis, with or without other symptoms, had an ulcer, and that many patients with intractable dyspepsia had either ulcer or "gastritis." Needless to say, any conclusions as to the value of medical treatment derived from those days are not trustworthy. Then we learned that hæmatemesis without pain was seldom, if ever, due to an ulcer, or at any rate to an ulcer that a surgeon could demonstrate, but was the result of bleeding from multiple gastric erosions, or, less often, from a single soft acute ulcer. Hæmatemesis with pain did not necessarily mean peptic ulcer; it might be associated with a tiny, withered-up appendix. Again, it was thought that hunger-pain meant duodenal ulcer, but many fruitless operations revealed that this was also misleading; hyperchlorhydria, often of reflex origin, might give this symptom without any ulcer. There was an unhappy period—up to 1920, or a little after—during which we were all at sea with regard to the diagnosis of gastric conditions; our methods were inadequate, and we no longer believed, as we had done before surgery taught us otherwise, that gastric or duodenal ulcer could be recognized with certainty. In this period, therefore, we get little or no help towards reading the natural prognosis of peptic ulcer, or the end-results of medical treatment. Shortly after 1920, methods of *x*-ray examination were worked out, perfected, and came into general use, and the study of symptoms and of chemical analyses made advances, so that now the diagnosis can be made with reasonable accuracy, and often with absolute certainty. The time has come at last, by using the material collected since 1920, to form some conclusions as to the prognosis.

Conclusions.

1. Until about ten years ago the diagnosis of gastric and duodenal ulcer, unless verified by perforation, operation, or necropsy, was so precarious that the older statistics of medical treatment are untrustworthy.

2. Spontaneous healing can undoubtedly occur, and is not infrequent. Perforation and hæmorrhage are marks of the chronic rather than the acute ulcer. About 25 per cent. of cases of peptic ulcer bleed. Perforation is common in ulcers of the anterior wall and usually occurs within a year or two of the onset; only a few, under 3 per cent., of ulcers of the posterior wall, of long standing, perforate.

3. The medical treatment of gastro-duodenal ulcer, in the best clinics, gives good immediate results. At least 75 per cent. become symptom-free. Only 40 per cent. remain so. From 15 to 20 per cent. of the patients will die within ten years. If the duration of symptoms was under a year, more than half the patients remain well; over a year, far fewer.

4. Obviously, therefore, efficient medical treatment should have a good trial. Equally obviously, a considerable number of the patients ought eventually to be operated on. Mechanical obstruction, or a large, deep ulcer that may be malignant, demands early operation.

5. The mortality and end-results of gastro-jejunostomy are set forth fairly, in an adequate number of cases treated by rank-and-file surgeons, followed up for at least four years, in the B. M. A. Collective Report. The operation mortality for duodenal, pyloric, and gastric ulcer was 5, 2.6, and 9 per cent. The follow-up, for both gastric and duodenal ulcer, showed 90 per cent. of successes (75 per cent. perfect) and about 4 per cent. of failures. Secondary gastro-jejunal ulcers followed in 2.8 per cent. of the duodenal and 0.8 per cent. of the gastric cases. Subsequent cancer was rarely, if ever, reported.

6. Individual English surgeons report a lower mortality (1 to 2 per cent. in duodenal and 3 to 4 per cent. in gastric cases). End-results are about the same as in the Collective Report, except that when a gastric ulcer is not removed the cure rate is at least 10 per cent. lower.

7. Continental and American results for gastro-jejunostomy are, for some reason not well understood, far less satisfactory. The mortality is about the same as in the Collective Report, but only 50 to 70 per cent. are cured, and 20 to 30 per cent. do badly.

8. Pyloroplasty gives results very similar to those of gastro-enterostomy.

9. Partial gastrectomy is advocated, to avoid gastro-jejunal ulcer or cancer, and to obtain a larger percentage of cures. Gastro-jejunal ulcer in England follows gastro-jejunostomy in 0.4 to 3.4 per cent. of the patients operated on. Cancer follows in about 2 per cent. of the cases. After partial gastrectomy, gastro-jejunal ulcer follows in about 0.6 per cent. of cases. Some anæmia may result from an extensive gastrectomy—mild in nearly half, serious in perhaps 10 per cent., in a few cases, quite severe.

10. The operative mortality of partial gastrectomy for gastric ulcer is from 4 to 10 per cent. Excellent results are obtained in about 80 per cent., poor results in 5 per cent.

11. Except in cases of large, deep, adherent gastric ulcers, which call for a resection, the results of partial gastrectomy for gastric ulcer are no better than those of simple gastro-enterostomy, in spite of a doubled operation mortality. They are not as good as those of gastro-enterostomy with wedge excision of the ulcer. This apparently does not hold good on the Continent or in America, owing to the poor results following gastro-jejunostomy in those countries. The end-results of this operation on 100 doctors at the Mayo Clinic, however, accord well with the figures obtained by English surgeons.

12. In cases of duodenal ulcer, partial gastrectomy or duodenectomy gives results no better than those of the B. M. A. report on gastro-jejunostomy, and the mortality is higher. Local excision of the ulcer, by itself, gives poor results (57 per cent. cured, 19 per cent. no better). Local excision with partial resection of the pyloric sphincter is better, but not as good as gastro-jejunostomy.

13. The deductions for treatment are: (*a*) If mechanical obstruction is not present, and cancer can be excluded with confidence, efficient medical treatment ought to be given a fair trial. (*b*) If it fails, or recurrence takes place, operation is indicated. For gastric ulcer the best operation is gastro-enterostomy with local removal of the ulcer. If the ulcer is large, deep, and adherent a partial gastrectomy is often better. (*c*) For simple pyloric stenosis, gastro-jejunostomy is best. It is safe and satisfactory. (*d*) For duodenal ulcer, gastro-jejunostomy is the best treatment. If the ulcer is readily accessible it should be excised.

It is a trite saying that statistics can be made to prove anything. It may be desirable to add, therefore, that the conclusions we have drawn from our statistical study coincide exactly with my own experience of the results of medical and surgical treatment of gastric and duodenal ulcer.

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Acute Intestinal Obstruction.

By IRVIN ABELL, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. XCV, No. 25, 20th December, 1930, p. 1903.)

THE most important single factor in the clinical consideration of acute intestinal obstruction is the element of time; a second one of great moment is offered by the site and character of the obstruction, whether high or low, the former pursuing a more rapidly fatal course than the latter. The precise significance of these two factors becomes apparent with a full realization of the sequence of events common to all types of acute intestinal obstruction; namely, mechanical obstruction of the intestine with stoppage of the fæcal current, damage to the bowel wall with ultimate gangrene and peritonitis, and an associated production of toxins often of the most virulent type. The high mortality that has obtained and still obtains in the treatment of intestinal obstruction is a serious indictment of both diagnostic ability and surgical initiative.

A study of accumulated statistics reveals what is common knowledge, to wit, that, while acute intestinal obstruction carries an inevitable mortality, the greater portion of the mortality may justly be attributed to delay in recognition and to tardiness in the institution of appropriate surgical treatment. The research workers by their physico-chemical studies of the body fluids have afforded much valuable aid in the appreciation of the changes in body chemistry with the indication of means to assist in the restoration of the latter, but the underlying fact, with which all adjuvants must be correlated, is that the obstruction is mechanical and must needs be corrected mechanically. The solution of the problem in the early hours following the advent of obstruction, when but simple obstructions are present, may require nothing further; the mortality is low and the results are brilliant if the obstruction is relieved before the wall of the bowel is compromised by pressure or strangulation, volvulus or thrombosis. With the incidence of the complications dependent on strangulation and toxæmia, which invariably follow the continued presence of the obstruction, the relief of the obstruction becomes but one of the indications to be met and the risk of any operative procedure is enormously enhanced.

Since early detection is of such overwhelming importance, I cannot forbear stressing the points leading to a diagnosis, even at the risk of being tedious from reiteration of that which has already been presented. Unfortunately, an attitude of ultraconservatism in diagnosis, awaiting the onset of symptoms that prove the presence of obstruction but also indicate the approach of dissolution, has been, if not the accepted rule, then one quite commonly followed. It is an unpardonable mistake to spend invaluable time in making differential diagnoses when symptoms of an abdominal emergency are evident. The presence of abdominal pain, vomiting and constipation with an absence of fever and leukocytosis should put the burden of proof on the medical attendant to show that no obstruction exists. The history, particularly if previous abdominal ailments are indicated, the physical examination, the presence of active peristalsis, visible or audible, with the flat roentgenogram interpreted by a competent radiologist, in addition to the three cardinal symptoms mentioned, should permit of a working diagnosis before the accession of fever, leukocytosis, distention and paresis indicate changes brought about by strangulation, and chemical examination of the blood shows profound alterations. Morphine and purgatives, as characterized by Haggard, but compound the felony of delay. The former, with its relief from pain affording the patient a false sense of security, denies him the relative safety which early operation offers and lets him drift into the dangers of delay, while the latter merely increases the damage which an already active peristalsis inflicts.

The principles underlying the surgical treatment of acute intestinal obstruction may be discussed under three headings: the preparation of the patient, the operation, and the post-operative treatment.

PREPARATION OF PATIENT.

The preparation of the patient will of necessity depend on the condition presented at the time of coming under observation, which in turn will depend on the location of the obstruction and the duration of its existence. If the duration of the obstruction has been short and the vomiting not excessive, the routine preparation for abdominal section will suffice with the added precaution of emptying the stomach and rectum, if perchance the latter has escaped the repeated enemas given as routine. When the vomiting has been excessive, which it usually is when the obstruction is situated high in the small bowel and when the duration of the obstruction has permitted the development of toxicity and dehydration, operation should not be undertaken until measures looking toward their correction have been instituted. The blood of such patients will show a decrease in the blood chlorides with a rise in its carbon dioxide combining power and a coincident rise in the non-protein nitrogen and urea. The lost chlorides should be replaced with sodium chloride in solution, both subcutaneously and intravenously, from 1 to 2 per cent. solution for the former, and from 3 to 5 per cent. solution for the latter, method of administration. In both instances it should be given slowly to prevent pain and, as well, damage to the tissues with which it comes in contact. Orr, with whose name much of the splendid blood research work in intestinal obstruction is connected, is of the opinion that the sodium chloride not only restores the normal balance in the blood but also acts as a definite therapeutic agent in overcoming the abnormal chemical changes found therein. Water should be given in abundance, subcutaneously and intravenously, to overcome the dehydration and, in those patients in whom starvation is evident, nourishment is to be added in the shape of dextrose. The technic of venoclysis as devised by Hendon, consisting of a special needle and fluid container, permits of a simple and satisfactory method for the continuous intravenous administration of fluids, water, saline solution, dextrose and citrated blood; the needle may be kept in the vein without change for as long as five days and the character of the fluid in course of administration may be changed at will. Blood transfusions in depleted patients are of definite help and may be given by this method with the least annoyance to the patient.

OPERATION.

The cure of acute intestinal obstruction depends on the removal of the obstruction by surgical operation. The operation in simple obstruction may likewise be simple, while with strangulation and toxæmia it can never be so classified. The three main objectives are: (*a*) the removal of highly toxic material from the intestine proximal to the obstruction; (*b*) the relief of the distension that is paralyzing the intestinal musculature, and (*c*) the restoration of the continuity of the intestinal lumen with the re-establishment of the fæcal current. The external obstructions are both visible and readily accessible, their one feature presenting at times a difficult problem being the management of the damaged intestine. If a portion of the intestine is not viable, resection is imperative provided the condition of the patient will withstand this amount of operative trauma; if plainly prohibited or if the gravity of the patient's condition is such as to make the wisdom of resection a matter of doubt, the gangrenous bowel should be amputated and the divided ends anchored outside the abdomen—shotgun-barrel enterostomy—to be closed later when local and general conditions have improved to the extent of making the operation reasonably safe.

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With internal simple obstructions involving the small intestine, the complete operation may be and should be carried out. In cases of advanced obstruction of the small intestine which have not reached the stage of gangrene but in which the circulation of the proximal segment has been impaired by the distension due to the imprisoned gases and toxic fluids, a fertile field is offered for the display of surgical judgment and craftsmanship. The distended intestine makes intra-abdominal manipulation difficult and often renders the recognition of the pathologic anatomy perplexing, while the friability of the bowel wall due to distension with impairment of circulation both at and above the site of strangulation makes anything other than the gentlest handling a matter of great hazard. Evisceration as a routine in such cases is contrary to sound surgical practice, it being a maxim that the less manipulation the greater the percentage of recoveries. However, I have not hesitated to employ evisceration in those cases in which the visualization and accessibility of the site of obstruction made it necessary. After the obstruction has been released, the distended intestine is emptied of its septic and toxic contents before it is returned to the abdomen; thus the necessary drainage of the distended bowel is accomplished and at the same time its return to the abdominal cavity is facilitated. The enterostomy opening may be closed or utilized for a more prolonged drainage as the exigency of the case may require.

In the advanced cases presenting dehydration, starvation and toxicity, the institution of appropriate measures for their correction still leaves the surgeon in a quandary in making a choice between the liberation of the obstruction with drainage of the distended intestine and being content with the latter procedure alone. Many lives have been saved that would otherwise have been lost, by the performing of a jejunostomy or enterostomy near the site of obstruction under local anæsthesia, the release of the obstruction being reserved for a later date when the absence of toxicity and a return of the bowel wall to its normal integrity make the necessary operative manipulation both safer and easier. It would seem that better drainage is obtained with the lower enterostomy and that it is more susceptible of spontaneous closure than jejunostomy. The stomach and duodenum can be effectively kept empty by an in-dwelling gastroduodenal tube. The employment of enterostomy alone is quite naturally reserved for the more desperate cases and offers no opportunity for determining the character of the obstruction or the condition of the intestine at the site of obstruction. Should the bowel be gangrenous, death from peritonitis is inevitable, since resection or amputation with the formation of a gun-barrel enterostomy offers the only opportunity of averting such an issue.

When the site of the obstruction is in the large bowel, granting that the lesion is not one productive of gangrene such as volvulus or hernial strangulation, enterostomy is the primary treatment of choice. Obstructions in the colon are devoid of the acute toxic manifestations noted with those situated in the small bowel, although the sequence of stoppage of the fæcal stream, strangulation, gangrene and peritonitis is much the same, if of slower progress. The disparity in size between the large and the small bowel makes for difficulty in anastomosis, while the œdema and vascular changes in the colon proximal to the obstruction greatly hamper accurate suturing and correspondingly increase the danger of leakage. The latter impediments are in large measure removed by preliminary drainage, the secondary operation then becoming one of election. In the event of gangrene of the colon, resection, if within the limit of sound surgical judgment, should be practised; otherwise sequestration of the gangrenous segment outside the abdomen, with low ileac enterostomy as a primary procedure, followed by restoration of bowel continuity at a later date, is the proper procedure. The selection of the anæsthetic will depend on the character of the proposed operation. Jejunostomy, low enterostomy and cæcostomy are readily and best accomplished under local anæsthesia. Muscular relaxation is essential for careful and accurate intra-abdominal work, particularly in the presence of intestinal distension and fragility; gas-oxygen with sufficient ether to overcome muscle rigidity meets these requirements. As spinal anæsthesia, by suppressing the inhibitory action of the spinal cord, permits excitatory action of the ganglions and promotes intestinal peristalsis, its use has been suggested in paretic ileus. In those cases in which an enterostomy has been done in the course of an advanced obstruction and in which the paresis from distension prevents drainage of more than the coil into which the enterostomy tube has been inserted, the injection of a spinal anæsthetic or—what is safer and experimentally accomplishes the same result—blocking of the splanchnic nerves, may be of distinct benefit. It has also been suggested that spinal anæsthesia will differentiate between mechanical and paralytic ileus; if, within fifteen minutes after the injection of the spinal anæsthetic, passage of gas and fæces and disappearance of distension is not obtained, enterostomy should be performed immediately; thus advantage may be taken of the anæsthesia already produced.

POST-OPERATIVE TREATMENT.

Vomiting is controlled by intermittent gastric lavage or by an in-dwelling gastroduodenal tube, the patient drinking water as desired, the unabsorbed portion of which returns through the tube without causing any discomfort. The body fluid and nutrition balance is maintained by subcutaneous and intravenous administration of saline solution and dextrose until such time as the resumption of normal peristalsis permits of oral administration. When an enterostomy has been performed it is essential to see that drainage occurs; this can be promoted by hot fomentations to the abdomen, saline irrigation of the intestinal lumen through the enterostomy tube and the cautious administration of a solution of pituitary hypodermically. These failing, splanchnic blocking or spinal anæsthesia should be tried. When no enterostomy has been done, colonic irrigation is employed in connection with the measures before mentioned to take care of the distension. It may be said in conclusion that while serologic research, choice of operative procedure and refinements in technic have contributed to a worth-while reduction in the mortality of acute intestinal obstruction, the greatest hinderance to its further reduction continues to be the delayed operation.

The Importance of Keratomalacia as a Cause of Blindness in India.

By R. E. WRIGHT, C.I.E., M.D. (Dub.), Lieut.-Col., I.M.S.

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KERATOMALACIA is almost certainly the chief cause of preventable blindness in children in the greater portion of the Indian Empire, and where similar conditions of malnutrition exist in other parts of the world it is likely to be of similar importance. In so far as the Madras Hospital is concerned—and it deals with about 20,000 out-patients per annum, fairly representative of the South Indian population—keratomalacia is responsible for more blindness amongst children than any of the other great blinding conditions of youth—*i.e.*, irritant remedies, smallpox, ophthalmia neonatorum, syphilis, and trachoma. Last year, for example, 187 cases of keratomalacia were registered at the out-patient department. Dr. P. A. Narayana Iyer, in charge of this department, kept

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a special record of 95 of the more advanced of these in which the eye lesions threatened vision. The record shows that 67 were under 5 years of age, that total blindness occurred in 30 cases, and practical blindness in 70 per cent. As compared with this, there were 59 cases of ophthalmia neonatorum and lesser numbers of the other conditions mentioned above. In only five of the 59 was vision totally lost, and in only three others was it seriously interfered with. Our experience has been that blindness is a very much more common sequel to keratomalacia than to ophthalmia neonatorum. This may possibly be associated with the fact that gonorrhœa, especially ophthalmia neonatorum, appears to run a milder course in this part of India than it does in England.

Keratomalacia, then, in so far as we are able to estimate, is the greatest cause of preventable blindness in the Madras Presidency in the first five years of life, a much greater cause in these years here than is ophthalmia neonatorum in England and Wales. This position with regard to keratomalacia is not, however, peculiar to the Madras Presidency. The professors of ophthalmology at Calcutta, Bombay, and Lucknow, Lieut.-Colonels Kirwan and Duggan, and Dr. Acharya, assure me that the same is true in Bengal, Bombay, and the United Provinces respectively. On the other hand, Colonel Dick, Professor of Ophthalmology, Lahore, informs me that keratomalacia is practically unknown in the Punjab. One of the great differences between the Punjab and the other areas mentioned above which influences the occurrence of keratomalacia is that the food in the Punjab gives a more complete diet, as pointed out by McCarrison. The inhabitants are largely wheat-eaters, not rice-eaters; moreover, the Punjabis also consume larger quantities of milk and milk products and other vitamin A-bearing foods. Hence there is very little deficiency disease in the Punjab.

The disease in adults, if not so frequently met with in India, has been well recognised, although one might gather from Pillat's work that it was practically unknown. Undoubtedly in India the disease as observed in children had been much more stressed because of its greater frequency, but the disease in adults was well known and recognised in the teaching ophthalmic centres throughout this country.

Importance of various vitamins.

The chief primary ætiological factor—but not the only factor in so far as our present knowledge goes—would appear to be a lack of fat-soluble vitamin A in the diet. It had long been recognised that the various eye signs and symptoms and the many other associated pathological states of the body in this disorder were primarily due to malnutrition. Later, the whole gamut of changes was ascribed, perhaps prematurely, to a deficiency in vitamin A. To-day, however, there are some who consider that it is not a pure vitamin-A deficiency but a multiple deficiency.

In so far as human cases are concerned, after various essays in experimental feeding we are at least able to say that crude cod-liver oil in suitable doses is the most effective agent in eliminating the major signs and symptoms of this deficiency-complex. This oil is probably largely effective by virtue of its vitamin-A content, but it also contains vitamins B, C, and D. There is no proof that it is the fat-soluble vitamin A alone in cod-liver oil which produces the beneficial effects in keratomalacia. Recently Dr. R. Muthayya of my staff has administered pure fat-soluble A (B.D.H.), kindly supplied by Colonel McCarrison, to children suffering from this disease, but they did not improve so rapidly as they ought to have done on crude cod-liver oil. In all probability it requires an initial multiple vitamin deficiency, with a secondary multiple dysfunction of glandular structures to account for the whole picture of degeneration, loss of function, wasting, necrosis, secondary infection, and death, which we see in keratomalacia. It seems more than likely that the principal initial factor is an A-deficiency and that certain of the prominent clinical features are due to the effects of this deficiency on important tissues and organs of the body, such as the epithelial surfaces of the integument and mucous membranes and their glandular diverticula.

Secondary infection.

Organismal infection, as the clinician understands it, is only seen as a terminal event. Children may drag on for weeks in a state of extreme marasmus, with recognisable pathogenic organisms present in large numbers in their usual areas of invasion—*e.g.*, respiratory tract, skin, and conjunctiva—without any specific change taking place. Such children may be transformed in a fortnight by cod-liver oil—sometimes administered on a flannel binder when the alimentary tract is too damaged to retain or use it—in a way that they could never be if bacterial invasion were the key to the position.

The primary pathological picture in the keratomalacia deficiency-complex is one of degeneration and wasting of epithelial surfaces, almost as distinctive a process as any of the classical degenerations. There is a tendency to proliferation, and metamorphosis to a lower type; columnar cubical epithelium tends to become squamous—*e.g.*, in the respiratory tract. In certain situations—*e.g.*, the skin—the pathological change is akin to the degenerative changes of senility. The clinical impression conveyed is that the effect of organismal attack in human keratomalacia is a late secondary association. Rises of temperature and blood changes are also probably secondary. I have seen numbers of keratomalacia cases, even moderately advanced, continue for weeks without a rise in temperature, but it is easy to picture how fever might be secondarily produced.

Associated clinical features.

There are certain clinical features of keratomalacia which may perhaps be viewed in the light of chance associations. Prominent amongst these in South India is the association of keratomalacia and liver disease, both in adults and children. It seems to be more common in the adult, but then we see fewer cases of adult keratomalacia, and liver disease is more common in the adult general population. Some years ago I considered that this combination was much more than a chance association, and laid unnecessary stress on the rôle of the liver in this disease. It would be foolish to deny that the liver may become deranged late in fat-soluble deficiency, and, like the simple secreting glands of the integument and alimentary canal or the thyroid, undergo definite changes in structure and function with the production of secondary changes which in time become summated to the disease complex, but I now know that the liver may be apparently perfectly normal in advanced keratomalacia, in so far as can be made out by clinical methods and modern biochemical tests.

The conjunctivæ.

Icterus of the ocular membranes is not uncommon in keratomalacia in South India. Frequently the peculiar olivaceous effect of the characteristic smoky conjunctival pigmentation is superimposed on the yellow subconjunctival tissues, and similarly in the skin. Apart from jaundice, however, the keratomalacic patient sometimes presents a subicteric tinge both of skin and mucous membranes, but as a rule the smoky discoloration predominates. These three factors need not, however, be confused. The smoky pigmentation of the conjunctiva is one of the most characteristic signs of the keratomalacic complex and may be observed in its purest form as an early feature in apparently well-nurtured children, where the pigment is seen superimposed on normal subconjunctival tissues.

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Colonel McCarrison suggested that the smoky pigmentation of the eye and the otherwise inexplicable puffiness and œdema sometimes seen may be an expression of an adrenal dysfunction due to the effects of an associated vitamin-B deficiency; we have therefore undertaken an experiment with yeast feeding, but so far its results have been negative.

The second factor in abnormal pigmentation is the icteric or subicteric tinge. This is sometimes so marked as to give an impression of jaundice, but suitable biochemical tests readily prove that it is not true icterus. It is essentially a yellowness of the epithelial and subepithelial tissues. It is somewhat similar, perhaps, to the yellowness said to be due to hypercarotinæmia, but makes its appearance under opposite conditions. The third pigmentation, true icterus, has already been referred to and its frequency in Madras explained.

In spite of any opinions previously expressed to the contrary, I have no knowledge of any ophthalmoscopic intra-ocular changes which might be given a place in this complex, excepting such changes as may directly or indirectly result from the corneal lesion.

Reviews.

SELECTIONS FROM THE PAPERS AND SPEECHES OF JOHN CHALMERS DaCOSTA, M.D., LL.D. Philadelphia and London: W. B. Saunders Company, 1931. Pp. 440. Illustrated. Price, 30s.

DR. DACOSTA is the Samuel D. Gross Professor of Surgery at the Jefferson Medical College, Philadelphia, and one of the foremost members of his profession in America. The selections from his papers and speeches cover a wide and varied field; some, as for example his sketch of the old Jefferson Hospital, have almost exclusively a local interest, others have a more general appeal. The author is a man of very definite likes and dislikes; among the latter we may mention his aversion—an attitude of mind shared by honest men of all nations—of the professional place-hunting politician. One wonders why Charles Dickens, of whom Dr. DaCosta is obviously an ardent student and devoted admirer, appears to be much more widely read and appreciated in America than in his own country. The book abounds in examples of the terse, epigrammatic phrase, but there are occasions (as at p. 29) when the mind wearies of this dazzling display of intellectual fireworks.

The fact that these letters and speeches were composed at different times and places has resulted in occasional repetition; for example, the flamboyant description of the exploits of the younger McClellan on p. 215 is repeated on p. 329. Of actual errors we detected relatively few. At p. 7 *a*llusions should be *a*llusions, and the quotation from Omar Khayyam at p. 199 is not strictly correct.

Printing and binding are good but, all things considered, the price (30*s*.) is high.

J. M. H.

TECHNIQUE AND RESULTS OF GRAFTING SKIN.—By H. Kenrick Christie, M.S. (N.Z.), F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1930. Pp. xii plus 67, with 35 illustrations. Price, 7s. 6d. net.

THE material for this little book was mainly collected whilst the author was Assistant Medical Superintendent at the St. Pancras Hospital, King's Cross, London, where he had the opportunity of dealing with a considerable number of cases due to ulcers, accidents and other causes of loss of tissue, where grafting operations were performed. The operation favoured was the Wolff graft, supplemented by Thiersch grafting for areas where the Wolff graft had failed to take. There is also a brief account of inlay grafting and the tubed-pedicle-graft method is described, though the author has only two examples of this type in his series. The account of the methods used is detailed, and is followed by a series of case reports of the sixteen cases on which the text is based. Attention has recently been focused on the subject of the treatment of varicose ulcers by the appearance of a series of papers on the results of treatment by elastic strapping, so that, for the time being, skin grafting is not popular, but most surgeons find themselves frequently obliged to perform this operation and they will find in this book a reliable guide to the best technique.

W. L. H.

TRAUMATOTHERAPY: THE TREATMENT OF THE INJURED.—By John J. Moorhead, B.Sc., M.D., F.A.C.S. (D.S.M.). Philadelphia and London: W. B. Saunders Company, 1931. Pp. 574, with 625 illustrations. Price, 32s. 6d. net.

IT is always refreshing to meet with something new, or to come across an old and interesting subject approached from a new and different standpoint.

The author of "Traumatotherapy," or traumatic surgery, has certainly written his book on accidents and emergencies from a new aspect, in that he deals exclusively with the clinical and therapeutic sides of this branch of surgery, ætiology and pathology being scarcely mentioned.

Indeed the volume may be classified as a textbook of accident surgery, a subject which is yearly becoming more and more important, and is beginning to be looked upon as a speciality in itself.

The first part of the book is devoted to wounds, and the appropriate treatment is described, the author pinning his faith on preliminary washing of the affected part with soap and water, and disinfecting the wound with tincture of iodine in all cases. Special attention is paid to wounds of the hand, the correct procedure for opening into the various fascial compartments which may be infected as a result of the wounds, being very carefully described.

Conditions, such as anthrax and erysipelas, are merely mentioned for they really do not come within the scope of the book.

The greater portion of the volume is taken up with the treatment of fractures, and in this connection Mr. Moorhead remarks that for him the saying, "a man is as old as his arteries," has no meaning. Rather it should be, "a man is as old as the neck of his femur." The latter saying is quite as true as the former.

This treatise on fractures is an extremely good one, backed up by numerous excellent illustrations, which make it very easy to follow the descriptions.

All the well-known methods of reduction are mentioned and discussed, and the author describes a repositor of his own invention, which is an electric motor with a traction device.

There is an interesting chapter on traumatic neuroses, and the book ends with the medico-legal aspect of injuries, etc.

The whole work is obviously the result of many years' experience and observation in this branch of

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surgery and Mr. Moorhead is to be congratulated on its production.

H. E. M.

GONORRHŒA AND KINDRED AFFECTIONS.—By George Robertson Livermore, M.D., F.A.C.S., and Edward Armin Schumann, A.B., M.D., F.A.C.S. New York and London: D. Appleton and Co., 1929. Pp. xvi plus 257, with 66 illustrations. Price, 18s. net.

THIS book is divided into two parts; part I deals with gonorrhœa in the male, chancroid, and verruga acuminata (G. R. Livermore), and part II with gonorrhœa in the female, and the infective granulomata (E. A. Schumann). Both sections discuss with great thoroughness the important subject of gonorrhœa and its complications. It is at once evident that the authors are describing conditions of which they have an intimate practical knowledge. The nine chapters on gonorrhœa in the male deal with the subject, as follows:—General considerations and ætiology; diagnosis, pathology, and prophylaxis; acute and chronic gonorrhœal infections; urethroscopy; complications of acute anterior and posterior urethritis; metastatic gonorrhœa; chancroid and verruga acuminata. Gonorrhœa in the female and the infectious granulomata are discussed in eleven chapters, as follows:—General considerations and ætiology; diagnosis; acute and chronic gonorrhœal infections; gonorrhœa in pregnancy, labour and the puerperium; gonorrhœa and sterility; gonorrhœa in childhood and senescence; metastatic gonorrhœa; unusual complications; vaccine and protein therapy; the infective granulomata. In this last chapter conditions are discussed which are a fruitful source of mistaken diagnosis, and a number of remarkable photographs are reproduced which illustrate this disgusting disease in females; curiously no mention is made of it in males.

Students and medical practitioners will find in this volume a concise, readable, and reliable account of gonorrhœa and kindred affections. The publishers are to be complimented on the appearance, excellent printing, and illustrations.

F. P. C.

HYPERTENSION.—By L. T. Gager, M.D. London: Baillière, Tindall and Cox, 1930. Pp. xiii plus 158. Price, 13s. 6d. net.

TREATISES on systematic medicine, which attempt to deal at all fully with both the clinical and the pathological aspects of disease, sometimes assume very considerable dimensions and in many of them there seems to be a tendency to deal more and more with the pathological aspects, so that students and busy practitioners have been heard to complain that they do not always find the clinical aid they seek. No such complaint, however, can be made against the book under review.

It is an interesting and instructive book and its author, Dr. Gager, is to be congratulated on such a lucid exposition of the problem. The opening sections on the definition of hypertension and its historical background are well informed and up to date. The chapter dealing with the relationship of hypertension with kidney diseases is very interesting. Special attention has also been paid in the subsequent chapters to the functional basis, the chemical factors, the symptomatology and the clinical aspects of the problem. As regards treatment of the condition, the author appears to be pessimistic. He is of opinion that results obtained by semi-starvation, restriction of activities, and an attempt at a "transvaluation of values" in the patients' world are likely to be as pathetic as were those in the undernutrition treatment of severe diabetes.

A special merit of the book is its abundance of references to literature which might awaken sufficient interest in the reader to read the original memoirs. The book can be warmly recommended as giving to students and practitioners all the information on this subject that they are likely to require in the course of their careers.

R. N. C.

HYPERTENSION AND NEPHRITIS.—By A. M. Fishberg, M.D. London: Baillière, Tindall and Cox, 1930. Pp. xvi plus 566, with 33 text figures. Price, 30s. net.

Hypertension and Nephritis by the American author, Dr. A. M. Fishberg, deserves more than a passing notice as it contains quite an array of ideas and data not generally found in ordinary books of medicine. Since the classical description of nephritis by John Bright, researches in the domains of pathology, biochemistry and clinical medicine have considerably altered our outlook and conceptions of the fundamental nature of the disease. The old classification of the types of the disease is no longer tenable in the light of modern findings and new disease entities, like nephrosis, essential hypertension, hypertensive encephalopathy, etc., which were previously grouped under the inclusive head of nephritis, have been recognised. Though it is some time ago since these new terms were introduced into medicine, it cannot be denied that a good deal of confusion and loose thinking as to their interpretation still exists, and we feel we shall be guilty of injustice if we do not give the author credit for the excellent exposition of these subjects.

The book appears to be primarily planned for the clinician. After giving a very short historical survey of the subject and a pathological picture, which is more of a theoretical and academic nature, it steps promptly into practical considerations of the symptomatology, diagnosis, prognosis and treatment. No new modes of therapy are revealed, but the well-recognised and time-honoured methods of treatment are prescribed, and it is also pleasing to note that the author has not allowed any particular idiosyncrasies to influence the accepted standards.

All through the book has been written in an admirable and forceful manner with attention to recent developments, and the subject-matter has been organised and systematised in such a way that the development of the knowledge is clear. The make-up and printing are worthy of the work, and the index is full and accurate.

R. N. C.

THE MORPHINE HABIT AND ITS PAINLESS TREATMENT.—By G. L. Scott, M.R.C.S., B.A. (Oxon.). London: H. K. Lewis and Co., Ltd., 1930. Pp. viii plus 94. Price, 5s. net.

THE morphine habit, particularly its treatment, is of great medical and social interest. There is already a considerable amount of literature regarding the ætiology, symptomatology and pathology of the morphine habit but very little has been written on the treatment of the addiction. The book, therefore, is likely to make a strong appeal to all medical men and social service workers interested in this problem.

The book contains 10 chapters, a preface and an appendix. The first four chapters deal with ætiology, symptoms and the "shock" caused by the withdrawal of the drug. The other chapters are devoted mainly to a consideration of the results obtained by the author on about 30 cases treated according to the scheme laid down in the appendix.

The book is written in a nice clear style, and can be read as a piece of light literature, but, from the point of view of treatment proper, the author has left much to be desired. Though primarily meant for medical men, the information contained will not be found adequate for their purposes. The author thinks that "It is not possible for any medical man who has not some knowledge of the difficulties to be met with to conduct satisfactorily withdrawal in cases of ordinary severity." He has referred to the "knock-out cure," "Dr. Jennings' voluntary renunciation" and

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"Lambert's treatment with brave doses of belladonna, hyoscine and drastic purgatives," etc.; but all these methods are more or less of academic interest and cannot be used without danger by a general practitioner to whom the addicts generally come and appeal for help.

R. N. C.

THE CARDIAC CYCLE.—By Harrington Sainsbury, O.B.E., M.D., F.R.C.P. Bristol: John Wright & Sons, Ltd., 1931. Pp. 79, with 1 diagram. Price, 5s. net.

In his prefatory note Dr. Sainsbury affirms his belief that "the attributes and affinities of matter, as we know them in the external world, when they make entrance into the composition of the living organism, are not put off, but continue to operate in obedience to the same laws, whilst within the new sphere of action, as governed their activities outside that sphere; consequently that the physiologist, when he comes to view the behaviour of the newly incorporated substance, must ever have in mind the laws of physics and of chemistry as still in force."

True to this belief, he has undertaken a description of the cardiac cycle, treating the subject as a problem in hydrodynamics rather than in physiology. This point of view imposes certain limitations on the discussion—we could find no mention, for example, of the part played by the cardiac nervous mechanism in the control of the heart. Again, there is enunciated a theory of the origin and propagation of the pulse wave which is not in harmony with current teaching.

Dr. Sainsbury's views will be sharply contested by the majority of cardiologists but his book should be read if only for its presentation of a difficult subject in a novel light. The size of the book makes such a reading possible in the course of an evening.

J. M. H.

PRACTICAL RADIATION THERAPY.—By Ira I. Kaplan, B.S., M.D., with a special chapter on Applied X-Ray Physics by Carl B. Braestrup, B.Sc., P.E. Philadelphia and London: W. B. Saunders Company, 1931. Pp. 354, with 227 illustrations. Price, 27s. 6d.

As the author points out in his foreword the practical side of radiation therapy has not been adequately dealt with in the English language although several useful treatises have been written in other languages. The author has therefore attempted to present in as simple and practical a manner as possible the principles of radiation therapy as applied in cases of malignant disease. No attempt has been made to describe all the methods known to be in use, nor to compare the various methods employed by other radiologists. The book under review merely offers a description of radiation therapy including radium and *x*-rays as practised at the Bellevue Hospital, New York City, and the treatments described therein are the actual methods used by the writer in his everyday practice.

After a brief historical note and two chapters on the definition, action and production of *x*-rays and radium, there comes a valuable chapter on applied *x*-ray physics.

The question of dosage is then considered and reference is made to the international physical unit of *x*-rays, designated as the "R-unit." The biological unit also receives consideration. This is apparently the standard used at the Bellevue Hospital. The *x*-ray therapy used in the treatment described in this book is apparently of two types, (1) superficial or moderate-voltage *x*-rays produced by 90–100 K. V. and 4 M. A., and (2) deep high-voltage *x*-rays produced by 180–200 K. V. and 4 M. A.

In considering treatment by radium, use is made of radium element and radium emanation; radium element is preferred by the writer. Under the head of practical radiation a series of cases are described, with photographs of the lesions before and after treatment. The description includes the result of biopsy, and the factors used in treatment whether by *x*-rays or radium.

The book is profusely illustrated and should prove most valuable, not only to the radiologist, but also to the general practitioner who can see therefrom the results to be expected from the treatment of malignant disease by radiation therapy.

J. A. S.

A MANUAL OF TUBERCULOSIS FOR NURSES.—By E. A. Underwood, M.A., B.Sc., M.B., Ch.B., D.P.H. (U. Glas.). Edinburgh: E. & S. Livingstone, 1931. Pp. vii plus 272. Illustrated. Price, Rs. 4-14. Available from Butterworth and Co. (India), Ltd., Calcutta.

Health exhibitions and intensive campaigns by the various tuberculosis associations in India are slowly but surely instilling into the minds of the populace that there is such a disease as tuberculosis, that the infection is widespread, that if taken early it is a curable disease, and that it is a preventable disease. With this gradual awakening of the masses and a corresponding desire for treatment and information as to how to avoid infection, the demand for nurses and health visitors skilled in tuberculosis work is bound to increase by leaps and bounds. This book is just what is needed as a textbook on the subject for those taking up this line of work. Although its title suggests that it is only for nurses, yet even medical students could read the book with much profit to themselves and their future patients. We know of no other book of a similar size and scope dealing with the subject so well. It is written in a readable and interesting style, the language is simple and where scientific terms have had to be introduced these have either been fully explained in the text or in a glossary at the end of the book. The only criticisms to be made are small and unimportant. On page 156 it states that miliary tuberculosis "is a result of the bursting of a *healed* focus of the disease into a blood vessel—usually a vein." This could be expressed in a less ambiguous manner. On page 161 it states that lumbar puncture is usually performed between the 4th and 5th lumbar vertebræ. The usual level is between the 3rd and 4th lumbar vertebræ. On page 197 in the section dealing with the light treatment of tuberculosis the author mentions that "exposure to ultra-violet rays causes an increase in the red and white corpuscles which circulate in the blood." In the days when ultra-violet light was boomed for every known disease this was thought to be true, but the most recent work on the subject tends to show that no permanent effect on blood formation is brought about, and that anæmia is uninfluenced by irradiation. It is a good book and at 6*s*. 6*d*. is really excellent value.

J. F. C.

BLOOD GROUPING IN RELATION TO CLINICAL AND LEGAL MEDICINE.—By L. H. Snyder, Sc.D. London: Baillière, Tindall and Cox, 1929. Pp. xi plus 153, with 4 plates and 28 figures in the text. Price, 22s. 6d. net.

The subject of blood groups has of late become so extensive and in parts obscure that it is now no easy matter to write a balanced book doing justice to the clinical, genetic, medico-legal and anthropological applications, and also to include an adequate account of the technical methods employed in the determination of the groups themselves. Professor Snyder has, however, by the use of an agreeably terse style succeeded in presenting in an able manner the main facts in quite a short work. We may also commend his judgment in omitting the non-essential.

The author, as he himself says in his preface, has treated the subject largely from the point of view of the geneticist and physiologist. The chapters on the heredity of blood groups are excellent. The author's name is here a landmark, for it was by his careful

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collection of data showing the blood groups of children arising from unions of persons of certain groups that facts emerged which could not be explained on the earlier hypothesis of von Dungern and Hirszfeld, and which offered on the other hand strong support to the theory of the three multiple allelomorphs which had been advanced by Bernstein.

On this matter it is important to appreciate two fundamental considerations:—

(1) That the now-accepted theory of Bernstein in no way invalidates the conclusions reached on the earlier hypothesis of von Dungern and Hirszfeld, but only still further limits the groups which may appear in the offspring of certain types of union.

(2) That it is in accord with all experience that a specific agglutinogen cannot appear in a child unless it was present in at least one of its parents.

It follows from (2) that in certain circumstances it may be presumed that a given child could not be the offspring of both its supposed parents, and, further, that such a presumption does not necessarily imply adherence to any genetic formula. The opinions of the author who is a pioneer on the subject are entitled to special consideration. He considers that the triple allelomorph hypothesis is amply proven. The upshot of the matter is that these tests may safely be used in the investigation of paternity cases which are thus placed on an entirely new basis. In no case can any man be proved to be the father of any given child, though in certain cases he may be ruled out as a possible father. The supposed father is therefore wise in permitting examination of his blood group since refusal to undergo examination invariably creates an unfavourable impression. The application of blood-grouping techniques to the identification of the origin of blood-stains, previously proved to be human by the precipitin test, is only very briefly discussed. This is a very important question which is likely to undergo considerable development in the near future.

The fascinating subject of the connection, if any, between the blood group and liability to certain diseases, *e.g.*, carcinoma, goitre, toxæmias of pregnancy, etc., is discussed. On this question information is very vague at present. Certain observations of unusual interest have however emerged. It has been reported, for example, that positive Wassermann reactions are harder to remove by treatment in persons of groups B and AB than in the groups A and O. It has been believed by some that divergences in blood groups may cause disposition to eclampsia. It has also been stated that differences in blood groups of husband and wife may retard the developing embryo and that extreme differences may even affect fecundity. These opinions at present rest upon a very insecure basis.

The application of the blood-group problem to the study of racial characteristics receives very adequate treatment. The author considers however that the anthropological application of blood groups has been somewhat overdone. There has been a tendency to assume that because it is a "blood test" it therefore gives a deeper insight into such questions than can be provided by the examination of other factors. This view is probably erroneous and it may be anticipated that in future the blood group will take its place alongside the morphological characters.

The lack of imagination shown in connection with the blood-group problem has been very striking; for example, the groundwork for the present activity in research on the racial phases of the problem was laid by L. & H. Hirszfeld, yet Hirszfeld records "that a reputable journal after keeping the manuscript of the original work for nine months returned it with the comment that the subject-matter would not interest physicians." Yet ten years later there were several journals devoted to blood grouping alone.

It is obvious that work of this kind necessitates an entirely satisfactory technique for the determination of the blood groups. The author's practical methods may very possibly be excellent, but we cannot regard the description given in this work as at all adequate. While fully agreeing with what is said one cannot help noticing an unfortunate lack of detail; for example, the important macroscopic test-tube method of determining groups is dismissed very briefly. The slide method described makes use of only one set of group A and B testing sera, whereas we consider that the results should always be confirmed by the use of a second independent set. The value of living supplies of red cells of known groups in persons in the laboratory and the confirmation of all negative agglutination results by testing the serum of the person under examination with these known cells are points of great technical importance not noticed by the author. The necessity of thin cell suspensions in the avoidance of anomalous results is not stressed, though the proportions recommended, *viz.*, 1 drop of blood to 3 c.c. of saline, would secure this. We see no reference to the obtaining of blood samples from infants by Franck's needle or similar appliances, which, while not providing serum as a separate entity, yet yield sufficient blood for the action of the agglutinins, if developed, to be seen by the cover-glass method of Lattes. We think also that most workers with slide techniques will prefer to use no cover-slip and to examine the result either by the naked eye or with a hand lens rather than by the cover-glass-microscopic method described by the author. We see no reference to the control of the occasional doubtful result by absorption tests. While we appreciate that the author probably did not intend his chapter on technique to serve as a laboratory manual of the subject, we think that he might with advantage considerably expand it in a later edition. This would make his work even more valuable than it is now.

The author's immense knowledge of the subject is apparent all through and it is a work which will be most suggestive to research workers. The author has been unfortunate in his frontispiece the colours of which are quite unlike those of the actual phenomena. An interesting innovation is the insertion of apt quotations from well-known authorities at the head of each chapter.

We congratulate the author on the production of a work of the very first class and our criticisms above relate to what are after all matters of technical detail. They are, however, details which every worker must master before the application of his blood grouping results to any problem can be of value, and they should find a place in manuals on the subject by leading authorities such as the present author. The work is a landmark in the literature.

R. B. L.

QUANTITATIVE CLINICAL CHEMISTRY—VOL. I: INTERPRETATIONS.—By John P. Peters, M.D., M.A., and Donald D. Van Slyke, Ph.D., Sc.D. London: Baillière, Tindall and Cox, 1931. Pp. xvi plus 1264, with 124 figures in the text. Price, 54s. net.

THE close collaboration of an eminent biochemist with a well-known professor of internal medicine has resulted in the production of a valuable book which deals with the subject of biochemistry in its application to the practical medicine of everyday life. At the present time biochemistry is making such rapid progress that it has already proved itself to be an important ally of clinical medicine in the discovery of the causes and cures of some of the important diseases. In the present case, the authority of the authors in their respective spheres of activity is unquestionable, and the close co-operation of a biochemist and of an internist of such eminence as the authors over a long period of time was bound to result in the collection of such important and illuminating materials that it was outside the scope of a single volume to deal with them either efficiently or effectively; thus the authors very wisely decided to deal with "Interpretations" in the present volume and with the methods of analysis in a separate volume,

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which, when ready, will provide an easy and reliable book of reference for laboratory workers.

The task of compiling a handbook on quantitative clinical medicine was taken up by the authors about six years ago, but it was soon found by them that such a fragmentary discussion of clinical interpretations would not provide the logical basis for deducing the actual causes of a given abnormality in a given case.

In the present volume the authors have made the best endeavours to give a clear, concise and precise summary of the voluminous literature on each of the different subjects discussed in the book and have given a generous bibliography, at the end of each chapter, which is of special interest in the book, and would, in our opinion, prove to be of invaluable assistance to those who desire to pursue further work on the subject.

The book consists of twenty-one chapters and gives a total of 4,000 important references. Each of the chapters deals with the physiological and biochemical aspects of the subject and discusses their application to clinical medicine, including diagnosis and therapy. A large amount of original work of the authors, the result of their own researches and investigations, has been included in the book.

Space does not permit us to make more than a passing reference to two of the chapters in the book under review. Chapter I deals with total metabolism which includes the caloric value of food-stuffs, respiratory quotients, respiratory metabolism, basal metabolism, the assimilation of food-stuffs, the relation of excretion to production of metabolic end products, etc. In Chapter II under the heading of carbohydrates, diabetes is considered in some detail. This section of the book is of great value not only for the importance of the subject itself but also for the admirable way in which the whole subject has been discussed and dealt with. As a matter of fact, the style of writing is so simple and clear and lucid that, though highly scientific and technical, the book almost reads like a romance. We have no hesitation in saying that the present volume will prove to be a standard work of reference and invaluable to those engaged in the study and practice of quantitative clinical chemistry.

J. P. B.

AN INTRODUCTION TO MEDICAL HISTORY AND CASE TAKING.—By G. Bourne, M.D. (Lond.), F.R.C.P. Edinburgh: E. & S. Livingstone, 1931. Pp. 195. Price, Rs. 4-8. Obtainable from Butterworth and Co. (India), Ltd., Calcutta.

IT is a small book in which the author has put down his experiences as a practical clinical teacher, in an excellent way. The volume, though meant for the beginners in clinical work, will be useful to all dealing with practical medicine.

S. P. B.

SYNOPSIS OF PHYSIOLOGY.—By N. J. Vazifdar, L.M. & S., F.C.P.S. Second Edition. Revised and Enlarged. Bombay: The Popular Book Depot, Lamington Road, Bombay 7, 1931. Pp. 546, with 85 illustrations. Price, Rs. 7-8. (Can be had from The Government Laboratory, Byculla, Bombay, and other Book-sellers.)

A SECOND edition of Vazifdar's *Synopsis of Physiology* has just appeared. It is a very useful book for students preparing for examinations, but as the name indicates and as the author states in his preface, it should be used as a companion volume to a good textbook of physiology. The first edition appeared in 1927 and the book is deservedly popular with students. There are 85 illustrations which are very useful; many of them are original.

I venture to make the following remarks for consideration when the next edition is due. There are too many misprints. The muscular and nervous tissues and the electrical phenomena of muscle and nerve might be discussed before dealing with the circulation. The amount of CO_2 in the blood shown in tables 6 and 7 is too low, but is given correctly in table 9. On page 200 uro-erythrin and urochrome are stated to be derived from the bile pigments. Lastly, the reticulo-endothelial system, Küpffer cells and van den Bergh's test are omitted.

A. C. MacG.

THE CONDUCT OF LIFE ASSURANCE EXAMINATIONS.—By E. M. Brockbank, M.D. (Vict.), F.R.C.P. London: H. K. Lewis and Co., Ltd., 1931. Pp. viii plus 172. Price, 7s. 6d. net.

THE general physician who only carries out occasional examinations for insurance companies is often given much extra correspondence because of his lack of appreciation of the peculiar aspect from which companies view this matter. Dr. Brockbank has written a most readable book on the different aspects of the work, and gives valuable advice on the points that enable the head office to assess the risks involved.

He discusses the various types of assurance, goes thoroughly through the points raised in the questionnaire which the examiner has to go through with the proposer, and then goes into the insurance aspect of the variations from the normal that may be found. He writes a very valuable chapter on tuberculosis.

There are occasional points in the book which obviously refer to work with European lives and are not true when applied to Indian lives, but the book can be read with benefit, and enjoyment, by any one who undertakes insurance work.

Dr. Brockbank has a pleasing wit, as for instance when he suggests that the view taken of heavy weight by a company varies with the weights of the directors.

M. O'C.

CHIKITSA JAGAT. (WRITTEN IN BENGALI.) A MONTHLY MEDICAL JOURNAL, NO. 7.—Edited by Dr. A. D. Mukherjee, 27C, Upper Circular Road, Calcutta. Annual subscription, Rs. 3-4. Each number, As. 5.

THIS is a monthly medical journal written in Bengali. The editor is Dr. A. D. Mukherjee who also edits an English medical journal meant for the licenciates in medicine. The seventh number of the Bengali journal deals with some commonplace symptoms, such as hæmoptysis in tuberculosis, asthma, constipation and vomiting in children. The practical portion of treatment is dealt with in a simple and elegant way. We wish all success to the journal.

S. P. B.

Annual Reports.

REPORT OF THE MEDICAL AND HEALTH DEPARTMENT OF THE COLONY OF MAURITIUS FOR THE YEAR 1929. BY J. B. KIRK, DIRECTOR, MEDICAL AND HEALTH DEPARTMENT, MAURITIUS.

THE island of Mauritius is familiar to malariologists on account of the investigations there by Sir Ronald Ross in 1908. It is interesting to note what is happening there now as regards malaria. Malaria still heads the list of "notable causes of death." Malaria and malarial cachexia together accounted for 2,310 deaths representing a mortality of 5.7 per 1,000. Four species of anopheles are known in the island; *costalis, funestus, maculipalpis* and *mauritianus*. *A. costalis* is the principal transmitter. Splenic indices vary from 1.5 to 23 per cent.

There is a special anti-malarial service (the MacGregor campaign), but it did little work in 1929. The new work consisted mainly of drainage and widening and deepening of the river Mensil, and sloping its banks.

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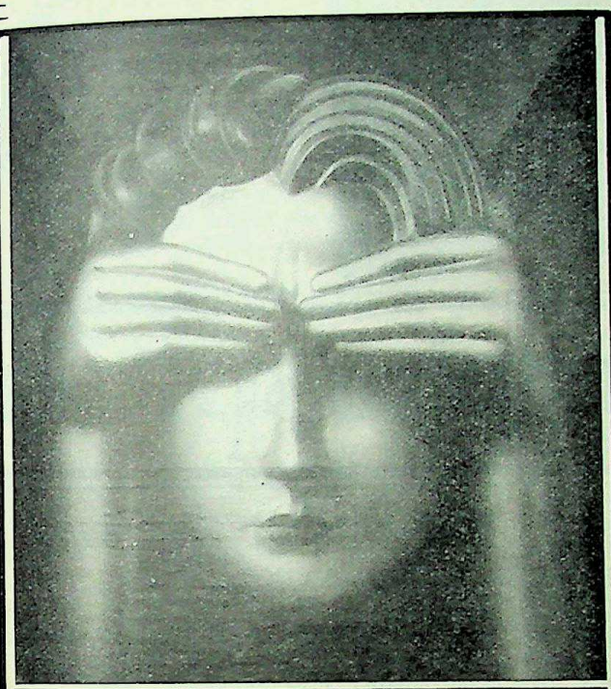

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The medical and health departments are under one director, Dr. J. Balfour Kirk, who has under him a staff of assistants for the various departments of hospitals, health officers, mental hospitals and ports.

The birth rate for 1929 was 34, the death rate 30.6 and the infant mortality rate 132.3. The density of the population of the island is high, the average being 563 persons per acre.

The mortality rate has risen in the last 2 years, as predicted. There is now no plague, and small-pox has been absent since 1913. Quarantine is effectively administered, but the proportion of vaccinated children is only 68 per cent. The situation is therefore not so safe as it seems.

Child mortality is receiving attention. The movement is progressing on the usual lines.

Schistosomiasis occurs in the island though the local intermediate host has not yet been discovered.

Clonorchis sinensis eggs have been found in the stools of a considerable proportion of inhabitants who have been resident in the island for 30 years. It has not been determined whether the disease is actively endemic in the island or not. Local snails have been experimented on with negative results, so far as finding cercaria is concerned.

Efforts to infect local snails with schistosomum were also negative, though various types of cercaria have been found naturally in fresh-water snails.

There is a special branch for hookworm work. About 34,000 treatments were given.

Improvement in water supplies and night-soil disposal is indicated.

Helminthic infections and malaria would seem to be the preventable diseases accounting for high morbidity and mortality.

From the report one would say there is an efficient medical and public health department, well administered.

ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH OF THE UNION OF SOUTH AFRICA FOR THE YEAR ENDING 1930.

THE Union of South Africa is a federation of 4 large states (the Cape Province, the Transvaal, Natal and the Orange Free State), formed shortly after the termination of the South African War. Its public health and its administration have therefore an interest for India at the present moment when the formation of an Indian federation seems imminent. The four states are given large freedom and responsibilities in public health. Local sanitary authorities are invested with similar responsibilities, though there are large tracts of sparsely-populated areas administered by district magistrates with no such local bodies. The Federal Department of Public Health has reserved to it the sanitary administration of the Union ports, the importation and exportation of diseases, inter-state carriage of disease, the administration of Food and Drugs and Therapeutic Substances Acts, all international health matters, the direction of policy and legislation for leprosy, the direction of all research work on malaria, plague, etc.

The Minister of Public Health has a Council of Health, and a Leprosy Advisory Committee to assist him in an advisory capacity. The offices of Secretary of the Department and Chief Health Officer of the Department are merged in one individual (Dr. J. A. Mitchell). The sections of the Department comprise port health officers, malaria, tuberculosis, housing, epidemic and infectious diseases, food, laboratories, district surgeons, inspection and field staff. The Council of Public Health meets once a year and discusses policy. It passes resolutions which go up to the Federal Government. The difficulties of divided administration are apparently being felt; one of the resolutions reads, "That in the opinion of this Council public health progress will be retarded until the control of public health, school medical inspection and medical poor relief is organized in any given area under one local authority, and for the whole Union under one central administration." The public health duties of the district surgeons are not quite clear. The vital statistics of the Union refer only to the European population. The native population statistics are very incomplete; in rural areas there is no compulsory registration of births and deaths. The European population is estimated at 1,700,000 odd, the Bantu at 5,200,000, Asiatics at 183,000, and mixed—570,000. The whole population of the Union is, therefore, about 7,777,000—not a high one considering the area. For the European population, the birth rate is 26 per 1,000, death rate 9.5 and the infantile mortality 64—excellent figures. The infantile mortality rate has dropped from 90 in 1920 to the present figure.

Interesting discussions are given on various diseases.

Leprosy.—The policy of the Union is compulsory segregation in official institutions. This policy had been criticised; but the report of Dr. Cochrane, Secretary of the British Empire Leprosy Relief Association, who visited and toured the Union indicates the latter's policy.

Malaria.—Sir Malcolm Watson, at the invitation of the Union, visited and toured certain parts and submitted some notes of very great interest. He pointed out again the importance of thorough scientific investigations preceding control work. In South Africa, as elsewhere, very mistaken notions are widespread as regards governmental action in the prevention of malaria. For the sake of the Indian public and the newspapers, it will not be out of place to reproduce Sir Malcolm's words, "It seems to me that the proper function of the Government in this matter is to provide the necessary general scientific knowledge, but that its detailed application should be made by the estates themselves."

"It is impossible for any government to undertake the control of malaria over extensive areas of estate land."

"The policy aimed at should be that anti-malarial measures should become a part of the routine medical and sanitary work of the estates, carried out under the supervision of the medical officers and managers of the estates, who could then be held personally responsible for the results obtained."

In a letter dated 11th July, 1930, he further states:—

"I hope I have made it clear to everyone that it is no part of the duty of government to clear up the malaria on private land. It would be an impossible task for government without an enormous staff, and it would get no thanks if it attempted this. Government can help with the scientific work, and possibly some experimental work—but that is all....."

Plague.—Researches in the Union have made it clear that the plague problem there is one of wild rodents and not domestic rats. Gerbils, striped and multimammate mice, and hares all harbour plague, and the last-named are often the means of transference of plague to human beings, as the tarabagan does in Manchuria. Whereas "deratization" is the word used in India and elsewhere, deverminization is the word coined for such destruction in South Africa. The problem is complicated by a special disease of rodents called "De Aar disease." Attempts to destroy rodents by spreading this disease are being tried. It is not communicable to man.

B. ærtrycke *infection.*—Dr. Sampson considers that food poisoning may be carried by birds, whose droppings may infect sheep, cattle and pigs, and transmit the infection to man.

The sunlight of South Africa appears to be very rich in ultra-violet rays.

The investigation of health conditions in the industrial areas is well known to industrial workers. The hygienic conditions of the mines now are said to be of a high standard and regular inspections by the Federal Health Council are made of all mines; regulations regarding conditions of housing, water and diet are made and carried out. Ankylostomiasis has been effectively dealt with by cleaning up infected ground, and by the lavish use of common salt in mines.

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Diphtheria, enteric fever, scarlet fever, and tuberculosis account for the greatest proportion of the mortality; cholera is not mentioned at all. Bilivaccine for typhoid is said to be widely used with satisfactory results.

The report is ably written, as we would expect; it is an exceedingly interesting record of able administration, research and practical sanitation.

LEPROSY HOSPITAL, DICHPALI, ANNUAL MEDICAL REPORT, DECEMBER 1ST, 1928, TO DECEMBER 1ST, 1929.

General policy.—The policy adopted in recent years has been maintained, namely that of admitting and keeping in the Hospital only those patients who are in a condition to benefit from treatment. This policy is continuing to justify itself and has made a marked difference to the atmosphere of the Hospital. All the patients now here are under full treatment and nearly all of them are improving slowly but surely. There has been no decrease in the number of patients and the Hospital is still much overcrowded in spite of some increase in accommodation. There has been a great increase in the number of applications for admission during the year, 574 patients in all applying. This is a record number for the Hospital. Of these 354 were admitted and 220 were refused admission as not being suitable for treatment.

Treatment.—Treatment by the hydnocarpus preparations, principally the oil and the esters of the oil, has been used during 1929. In addition thyroid extract has been given in a large number of cases as a tonic and an adjuvant in treatment. The results of this change in treatment have been a marked improvement in the general physical fitness of the patients as a whole.

Results of treatment.—This statement of the results of leprosy treatment is admittedly a critical one. We consider that the publication of too optimistic reports of the results of leprosy treatment may do harm to the cause we have at heart, namely, that of eradicating the disease. If doctors and patients are led to expect too much, disappointment is bound to follow and leprosy treatment will fall into disrepute. In this statement we have made a point of mentioning the shortcomings of the treatment. We believe that in the long run the cause we serve will not suffer as the result of frank statement of the difficulties. In spite of these difficulties even now leprosy treatment is well worth while and we hope that as the result of the vast amount of work that is now being done by medical men all over the world new and better methods of treatment will be evolved.

It is difficult to give statistical returns on an annual basis which reflect accurately the results of treatment. This is because the ordinary period of treatment necessary in the average case of leprosy is much more than one year. Only very early cases are likely to clear up within one year and consequently the more severe cases appear in the annual returns year after year while the early cases only appear once. A leprosy hospital tends to get silted up with the very bad cases, the early cases leaving comparatively quickly. The annual statistics suffer accordingly.

The results of treatment may be summarised as follows:—

(1) In almost every case the progress of the disease can be arrested.

(2) In many early cases the infection is apparently overcome and no bacilli can be found clinically.

(3) In more advanced cases, which form the bulk of our patients, the progress of the disease is arrested, the existing lesions become less, the nasal discharge can be rendered free from bacilli, thus much diminishing the infectivity, and after prolonged treatment the disease apparently becomes inactive although some acid-fast bacilli can be found in the skin.

Thus it appears that in early cases we can hope to "cure" the disease, that is to eradicate the infection, but in more advanced cases it is sounder medically to talk of "controlling" the infection and arresting the disease rather than of eradicating it.

Courses of instruction in leprosy.—During 1929 we have held three courses of instruction each of two weeks duration which have been attended by Government doctors and others. The total number of doctors attending was 28, made up as follows:—

20 medical officers of H. E. H. the Nizam's Government.
3 medical officers of the Indian Medical Department.
1 medical officer of the N. G. S. Railways.
2 health officers.
2 missionary doctors.

The courses are recognised and financed by the British Empire Leprosy Relief Association.

OUT-PATIENT WORK.

Hyderabad.—The out-patient clinic has been maintained at Dhoolpet, Hyderabad, and the average attendance during the year has been 52.

Dichpali.—We are now attempting to build up a good out-patient clinic in Dichpali. During October lantern lectures were given in several villages round Dichpali and the prevalence of leprosy in these villages was investigated. As the result of this it was found that about 1 per cent. of the village people have leprosy, and we now have 35 patients attending as out-patients at Dichpali. We believe this to be the beginning of an important development of our work. We wish to continue this village work and we see no reason why in a few months we should not have 100 or more out-patients at Dichpali.

SHANGHAI MUNICIPAL COUNCIL, PUBLIC HEALTH DEPARTMENT, ANNUAL REPORT, 1930. BY J. H. JORDAN, M.C., B.A., M.B. (CANTAB.), D.P.H. (LOND.), COMMISSIONER OF PUBLIC HEALTH. KELLY & WALSH, LTD., SHANGHAI. 1931.

GREATER Shanghai consists of (*a*) the International Settlement, (*b*) the French Concession and (*c*) the Chinese Municipal areas. The whole has a population of 58,276 foreigners and 2,922,374 Chinese, a total of 2,980,650 souls. The International Settlement has a population of 1,007,868, made up of 36,471 foreigners and 971,397 Chinese. The report refers only to the International Settlement, the other two elements being separate municipalities. The public health department of the Settlement is large and complete, comprising administration, sanitary, hospital, food, drainage, markets and sanitation divisions, which indicate its activities. The climate of Shanghai is hot and moist in the summer and cold and damp in the winter. The foreign death rate in 1930 was 18.15 and the Chinese 16.42 per 1,000. Some adjustment for age and sex and race is evidently necessary before one could interpret these rates, which appear to be rather high for foreigners and low for Chinese. The foreigners, however, include a large number of Asiatics.

The water supply is chlorinated and of a high bacteriological purity, but its distribution is apparently faulty and the Health Commissioner places great stress on remedying this defect. Much polluted water would seem to be made use of with the inevitable result of outbreaks of cholera. Cholera appears every year in Shanghai though in 1930 it appeared much later than usual.

A Ministry of Health has now been formed by the Nanking Government of China. A National Quarantine Service has been appointed, with Dr. Wu Lien Teh as its executive officer with headquarters at Shanghai. A conference was held at Shanghai under the auspices of the League of Nations and the Ministry of Health of China to discuss joint anti-cholera measures. Certain measures were agreed on regarding the collection of information and notifying of cholera cases.

There was a very large and disconcerting increase in the number of malaria cases in the Settlement area. The arrival of the defence forces in 1927 was apparently

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GENLIN is Extract of Gastric Tissue in powder form, and represents the fundal membrane—the portion secreting hydrochloric acid and gastric juices. It is prepared from officially certified material, and processed under technical supervision.

GENLIN is tasteless and odourless and may be administered as an alternative to, or in conjunction with HEPABOS. It is **palatable** and **economical** and is easily administered; preferably in fruit juice.

Usual dosage is: INITIAL—20 grams (two well heaped teaspoonsful 3 times daily).

MAINTENANCE—10 grams (one well heaped teaspoonful 3 times daily).

GENLIN is supplied in sealed bottles containing 4 ozs. net (114 grams) at Rs. 7-8 per bottle at all good chemists. Half size Rs. 4.

All our preparations before being placed at the disposal of the medical profession are clinically tested and proved efficacious by leading physicians at large public hospitals.

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Extract from the Medical Journal of Australia, October 4, 1930.

(The Official Journal of the B.M.A. in Australia).

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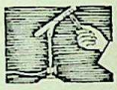
DURING PREGNANCY

IN the preparation for motherhood be the patient a young primigravida or an experienced multigravida slim and delicate or generously built besides the routine tests  among your urgent instructions will be

"Regular bowel movements daily." That will prevent many a headache, feeling of lassitude, and perhaps hæmorrhoids in the later months. You can prescribe AGAROL safely, because it exerts no effect upon the uterus nor does it interfere with lactation. Besides it is easily taken because it is palatable without artificial flavouring.

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the origin of the present increase. No information is given as to the types of anophelines present, but there seem to be a large number of ponds, etc., requiring filling up.

Cerebro-spinal fever assumed epidemic proportions during the year, and 201 deaths out of 329 notified cases occurred.

Notification of communicable diseases is not compulsory though voluntary notification and payment ensures information being received from most of the registered practitioners. A curious system of disposing of dead bodies exists amongst the Chinese; "unwanted" corpses are placed on certain vacant grounds and an organisation called the Shanghai Benevolent Cemetery collects these bodies and buries them.

Registration of medical practitioners is now voluntary. The record of the work in the pathological laboratory reveals a great variety of work. Tuberculosis is rife, and a clinic and sanatorium minister to this disease. The meat and food markets appear to be excellent. The rest of the report follows the usual lines of such reports and bears evidence of the existence of a thoroughly up-to-date, efficient, and energetic health department.

ANNUAL REPORT OF MEDICAL INSPECTION OF SCHOOL CHILDREN OF PESHAWAR, BANNU AND DERA ISMAIL KHAN MUNICIPALITIES, NORTH-WEST FRONTIER PROVINCE, FOR THE YEAR JULY 1929 TO JUNE 1930. BY MAJOR W. E. R. DIMOND, D.P.H., ASSISTANT DIRECTOR OF PUBLIC HEALTH, NORTH-WEST FRONTIER PROVINCE.

THIS report sets forth the first year of working of a scheme for medical inspection of school children of the North-West Frontier Province. A start has been made with three main municipalities. The system is to examine all the school children (boys) in the primary and secondary departments. It has proved very successful; premises are now cleaner and better kept, latrines are sanitary, and dormitories of schools are well looked after. Co-operation with teachers and with parents has been well established. 81 per cent. of the children reported as requiring medical treatment are stated to have received it.

At 6 years of age, the average height of the Frontier child is 3 feet 6.6 inches, in England 3 feet, 8 inches; average weights are 2 stone 8.8 lb. and 3 stone 2½ lb., respectively. The defects found are in vision (10.5 per cent.), dental caries (29 per cent.), and tonsils and adenoids (32 per cent.). Only 20 cases of tuberculosis are stated to have been found out of 25,000 children, but in the tabular statement there are 1,540 cases of "cervical glands" reported as having been discovered; no comment is made on this. The spleen rate on the average works out at 11.5 per cent.

The work seems to have been very well and tactfully carried out and we hope the present young Frontiersman will grow up with fewer disabilities than his father.

This is a good type of practical health work which should be initiated everywhere.

REPORT ON THE WORK OF THE CONFERENCES OF DIRECTORS OF SCHOOLS OF HYGIENE WITH A MEMORANDUM ON THE TEACHING OF HYGIENE IN VARIOUS EUROPEAN COUNTRIES. BY PROFESSOR CARL PRAUSNITZ AND PROFESSOR LEON BERNARD. LEAGUE OF NATIONS, GENEVA, 1930. PRICE, 5*s*. OR $1.25.

IT will be remembered that about 1912 Mr. Norman Angel published a book in which he asserted that a general European war would be an impossibility, as the economic relations of the large European countries were so closely related that war would be a disaster to all, and that the nations and their representatives would never be so foolish as to commit national suicide in this way. His advice and his conclusions were unheeded in 1914, but it would appear that a large part of his forebodings was true and that the present economic crisis is still part of the aftermath of the reckless expenditure of the 1914—18 period. Several lessons were learned, however. As Professor Prausnitz says in his introduction:—"The progress of civilisation consists to a great extent in the more thorough and conscientious acceptance of responsibility for human life and health by the nations of the world and by the individuals who compose these nations." The war itself showed, especially in the countries of central Europe, what calamities of disease and epidemics could follow in the wake of a break-down of social organisation. Consequently, after the war, particularly in the newly constituted European countries, such as Yugoslavia, Czechoslovakia and Poland, there was a public demand for hygiene, and one of the first tasks to which the new administrations addressed themselves was the organization of public health and medical services, designed to educate the nation in health matters and to hew out a path of health progress at the start. The Rockefeller Foundation aided these objects and enterprises in many ways. Schools of hygiene have been established in London, Prague (Czechoslovakia), Budapest (Hungary), Warsaw (Poland), and Zagreb (Yugoslavia). The League of Nations (Health Section) is naturally interested in the considerations of such national health movements, and in 1923 appointed a commission to collect information in the universities of Europe, America and Japan as regards the study of hygiene and preventive medicine. They collected information under the following heads:—Instruction in hygiene for medical students, instruction for health experts, popular education, and propaganda in hygiene. In the course of this investigation, the commission naturally visited the various newly-established schools of hygiene, and the present booklet under consideration consists largely of a description of these schools in Europe, their construction, their outlook and their scope of work, educational, practical, and research. The booklet makes very interesting reading from the point of view of comparative political and medical administration, and indicates how bravely adversity has been met and problems handled. The scope of these schools varies with the system of medical education in the country, with the system of public health administration, with the stage of development of the state health services and the qualifications demanded for its personnel, and with the necessity or otherwise for the manufacture and control of biological products, such as lymph vaccine, sera, etc. In some of the schools, the manufacture of laboratory products and laboratory examinations predominates, while other schools concentrate on education.

Speaking generally, the most important functions of such schools should be education and research. Some are actively engaged in actual state public health work and form part of the Ministry of Health, others are merely advisory in this capacity or have no direct connection with state activities. In education there is a wide field; future physicians (medical students), aspirants to the health services, sanitary engineers and the auxiliary sanitary personnel (sanitary inspectors, nurses, health visitors), all need special education in health matters. Then there is the general public, without whose intelligent co-operation no far-reaching results can be obtained. Then refresher and advanced courses of instruction are required for general practitioners and medical officers of health. On the research side, both pure and applied research can be undertaken, though it is in the latter field that schools of hygiene will find most suitable subjects of study.

The pamphlet is of the greatest importance to all those interested in the comparative aspects of public health development. The essentials for such progress

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are very well stated in Professor Leon Bernard's words. "Unless a body of trained experts is formed, no public health work is possible. Without the collaboration of a medical profession having a clear perception of the aims and methods of preventive medicine, the work of these experts would remain imperfect and sterile; without the support of the masses, hygiene would appear as an arbitrary collection of prescriptions and irritating formalities, resembling police regulations, and would remain a dead letter. The three aspects of the problem are closely related and, if our efforts are to be successful, this interdependence must be remembered."

The schools of hygiene in America are well known. The All-India Institute of Public Health and Hygiene will be another school of hygiene made possible by the help of the Rockefeller Foundation. In the first instance, education and research will be the main functions of the new Institute. Its further relationships and functions will depend to some extent on the form of India's new constitution.

BUTTER FAT (GHEE): ITS NUTRITIVE VALUE, ADULTERATION, DETECTION AND ESTIMATION. BY PROFS. N. N. GODBOLE AND SADGOPAL, B.Sc. DEPARTMENT OF INDUSTRIAL CHEMISTRY. BENARES HINDU UNIVERSITY, BENARES. OCTOBER, 1930. PP. 48.

PROFESSORS Godbole and Sadgopal in this interesting brochure have drawn attention to the importance of ghee in the dietary of the Indian peoples, to its widespread adulteration all over India and the difficulty that exists in the detection of such adulteration in many instances. While these observations are confined to ghee, their pamphlet indirectly raises the whole question of food adulteration in India and the machinery that exists, or should exist, for its detection and suppression. In English law, the Sale of Food and Drugs Acts from 1875 onwards do not pick out any particular food for special attention nor do they lay down standards for any particular food. Power is given to the Board of Agriculture to lay down standards of purity for milk and milk products and the Board has done so in respect of milk, butter and margarine. In respect of other food-stuffs it is left to the public analyst to report on samples sent to him for analysis, as to whether he considers such genuine or not, if not, he must state his opinion as to the nature and quality of the adulterant. In the case of milk, minimum standards for the percentage of milk fat and solid-not-fat are laid down (3 and 8.5 per cent. respectively). For butter (the substance analogous to ghee in India) only a maximum percentage of water is stated, and it is left to the analyst to determine whether the fat present is pure butter fat or not, and to state the adulteration, if any, in the terms noted above. This indefiniteness in English law is deliberate, and leaves the administration and decisions of the law to the sense and experience of judges and magistrates. This system has not been found suitable for India. Most of the provinces and the large cities of India have food adulteration laws, but these remain dead letters until standards of purity have been fixed for the common food-stuffs, and machinery created for the collection and chemical examination of samples. Bengal, we believe, was the first province in India to deal with adulteration in a practical fashion. After numerous analyses carried out in its Public Health Laboratory, it fixed certain standards for ghee, *viz.*, a refractometer value between 40 and 42 at 40°C. and minimum Reichert-Wollny values of 24 for cow ghee, 28 for mixed ghee, and 30 for buffalo ghee. The acceptance of these two tests as standards did not preclude the public analyst from utilising any other tests (saponification value, iodine value, barium number, etc.), in any doubtful cases; but it placed him in an awkward position if, as the result of extensive examinations, he considered the sample adulterated, despite the fact that its refractometer and Reichert-Wollny values lay within the prescribed limits. This fact illustrates the difficulty in setting limiting standards of purity—a difficulty which English law foresaw and avoided by making no standards at all for butter except the maximum percentage of water. Most Indian provinces have followed Bengal's lead in the matter of fixing standards for ghee. Madras, however, follows the English system, fixing only the percentage of allowable water in ghee leaving to the experience and judgment of the public analyst to report on the purity of the fat present. In 1924 a committee of the Calcutta Corporation sat with a view to advocating limiting standards for listed food-stuffs under the Calcutta Municipal Act of 1923. This committee, after taking the advice of experienced analysts and after conducting a large series of tests on ghees from all over India, advised the following standards for ghee:—Refractometer reading at 40°C., 40 to 42.5, Reichert Wollny figure minimum 24 for cow ghee, and 30 for buffalo ghee, and a saponification minimum value of 220. We understand that these values are giving satisfactory results.

This leads to the difficult question of fixing standards of chemical purity for legal purposes from chemical constants. At first sight it might be assumed that the minimum figures of a series of samples of known purity should be taken as a legal standard. This would so obviously lead to legalised adulteration, thereby defeating the aims of protective legislation, that it is impracticable. The means of a large number of pure commercial samples might be taken, but this would again be on the high side and would react unjustly on many samples below the mean. The mean minus three times its probable error or standard deviation would be mathematically just and as a matter of fact gives a very good figure.

The 3 per cent. figure for milk in England is below the average figure for mixed-herd milk, though some milks from individual cows may give fat percentages below 3; in these latter instances a defence that the milk was from a single cow may be accepted by a magistrate. But the large producer of milk in the United Kingdom now breed herds that will give a *mixed* milk of the required standards in fat and solids-not-fat.

Having indicated the general position, we come to the consideration of the more immediate problem of ghee, and Professors Godbole and Sadgopal's brochure. They have considered ghee from the question of nutritive value, and adulteration (detection and estimation). They have been exceedingly industrious and have provided an excellent survey of the literature on the subject of butter fat. Some of the work on ghee in India they have omitted to refer to, probably however because a great deal of it is in reports to governments or to corporations. An important paper by Dr. B. B. Brahmachari, however, in the *Indian Medical Gazette* should not have escaped their attention.

The authors would place the digestibility and absorbability of the edible fats and oils as functions of the melting point and the mean molecular weight. The following would therefore represent the order of digestibility and absorbability, (1) butter fat, (2) cocoanut oil, (3) vegetable oil, (4) animal fats and hydrogenated oils. The opinions are based on statements by German authors and would require corroboration by experimental work in India. As regards vitamins A and D, the authors do not differentiate between butter fat and ghee. The ordinary methods of preparing ghee by prolonged heating in air undoubtedly destroy vitamin A present in the natural butter fat, though the vitamin D, being more thermostabile, resists such prolonged heating better than vitamin A. In the second part, the authors pass in review the various physical and chemical tests for the purity of butter fat, but apparently reject them all as untrustworthy for one reason or another. They would appear to be hunting for some one infallible method of detecting adulteration or establishing purity. Most analysts have accepted this view as an impossibility and are content to form an opinion on the results of

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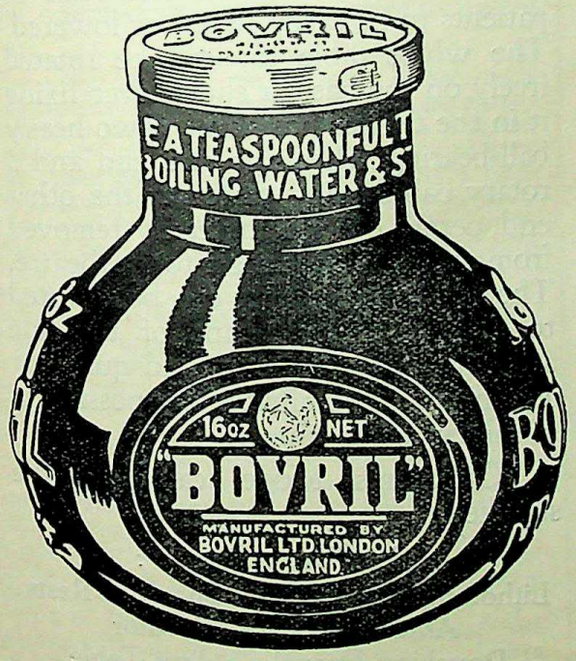

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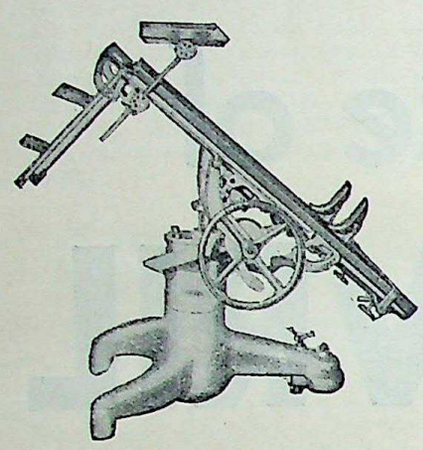

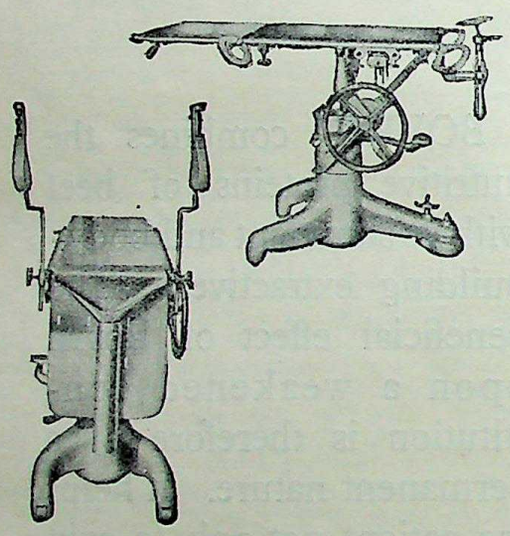

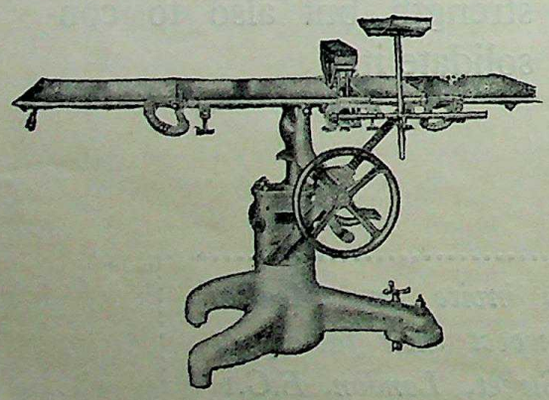

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four or five or more different tests. In discussing the Reichert Wollny values, no mention is made of the varying values for cow and buffalo ghee, though this is one of the great problems that the analyst is up against, owing to the more highly priced cow ghee having a lower Reichert Wollny value. The barium value is discussed somewhat too summarily. In certain circumstances, this estimation aids in the detection of adulteration by cocoanut oil and lard, the two values being additive. Halphen's test is referred to as a method of detection of sesame oil; it is, of course, for cotton-seed oil. The authors finally pin their faith on two examinations, (1) the presence of coloured fringes in the butyro-refractometer, and (2) the A and B values of Holde. This latter test depends on the butyric glyceride content. By adding adulterants, such as cocoanut oil, vegetable ghee, and tallow to ghee and examining the separate mixtures thus made, the authors have arrived at certain values for A and B. (The A value is a measure of the soluble magnesium salts of the fatty acids convertible into insoluble silver salts. The B value is a measure of the silver butyrate which is soluble in silver sulphate solution.) The values for A and B found with various percentages of the separate adulterants can, it is suggested, be used both as a detection of adulteration and an estimation of the particular adulterant. The authors do not indicate how mixtures of adulterants could be dealt with, or how far the method could be used for standardisation work. The test undoubtedly has a value as an adjunct, but we find it difficult to share the enthusiasm of the authors that it will serve as an infallible guide for detection and estimation of general adulteration of ghee. Were it alone to be used the skilled sophisticator could easily circumvent detection by various admixtures, even with synthetic butyrate as the authors themselves suggest.

We welcome the brochure, as a valuable and suggestive piece of work on a very difficult and important question in India, which will help and stimulate workers to further experimentation. With regard to standards, our own view is that a series of standards should be chosen based on the examination of a large number of mixed samples of known purity, not samples of ghee prepared from individual animals. The former is the type of ghee commonly sold; just as mixed milk is the type of milk commonly sold in England. In the latter instance the standards are suited to mixed-herd milk, and not to individual milks. This is the method that has been adopted in fixing standards for ghee in Calcutta and Bengal. Experience and further experiment may show defects and limitations, but the only method of advance is to get ahead with legislation and standards and the machinery for collection and analysis. Both the lay public and the administrators of the law have to be reminded that adulteration (even gross adulteration) is not necessarily harmful to health, but the offence against the individual buyer and the law of the land is, nevertheless, just as heinous, and merits just as high punishment as if it were injurious. We are glad to review this piece of work on the part of Professors Godbole and Sadgopal and to congratulate them in placing before the Indian public, scientific and lay, something that should interest and lead to some concerted public action against the continued adulteration of ghee.

Correspondence.

A CASE OF ACUTE PULMONARY ŒDEMA IN AN ADULT, AS THE RESULT OF A SCORPION STING.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—With reference to the case of acute pulmonary œdema in an adult, as the result of a scorpion sting, reported in the April 1931 issue of the *Indian Medical Gazette* by Dr. Ince, it is stated in the remarks that "as far as can be ascertained pulmonary œdema has never occurred in any case." About the beginning of 1920 when I was stationed at Vizagapatam a boy, aged about 15 years, was stung by a scorpion at about 2 p.m. one afternoon while preparing to sleep after a heavy meal. Soon after this, the boy was given a cold bath near a well, as this was suggested by somebody. The boy suffered pain for some time and afterwards suffered from cold clammy sweats, and complained of difficulty of breathing. It was about 6 p.m. when I saw him; he was then restless, cyanosed, with a feeble rapid pulse, and a subnormal temperature. There were fine crepitations in both the lungs and coughing of rose-coloured blood-stained frothy fluid. I had given him the usual treatment with hot water bottles, warm blankets, injections of atropine, adrenalin, digitalin and strychnine with brandy internally. His heart was maintained in good condition the whole night. I had to go about my work next morning and in another two hours the boy was reported to have died suddenly, possibly from cardiac failure.

This is an undoubted case of acute pulmonary œdema following scorpion bite. The cold bath and heavy meal appear to have precipitated the attack.—Yours, etc.,

CH. KRISHNAMURTY, L.M.P.

GOVERNMENT HOSPITAL,
RAJAHMUNDRY.
29th June, 1931.

MALARIA IN BOMBAY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—My attention has been drawn to Dr. P. A. Dalal's letter "Malaria in Bombay" printed on page 235 in the April number of the *Indian Medical Gazette*. Dr. Dalal objects to your remarks, "it would appear that vigorous anti-malarial measures are now being taken in Bombay," and says, "the measures adopted in Bombay are neither radical nor systematic. It cannot be truly said that any single recommendation of Major Covell has been put into practice in its entirety."

I wonder what is Dr. Dalal's source of information. Major Covell's recommendations for checking malaria in Bombay are given on pages 42 to 59 of his report, and I give below the results of the actions so far carried out:—

Wells.—Out of 2,429 open, or partially open, wells, which existed in the city in 1928, there are now 1,331 such wells. Out of these, it is proposed to retain 478 for the religious needs of the people. The number of wells to be dealt with is thus 853; these would have been diminished considerably ere long, though not completely eliminated, had there been no opposition from the public to the proposed measure. The opposition was so great that the action had to be suspended and the Corporation had to appoint a committee to enquire into the merits or otherwise of each case in which there was a protest. That committee has not yet arrived at a decision in regard to the wells in C, D, E, F and G wards and therefore, although the action is not at a standstill, it is a little slow.

Cisterns.—All the cisterns in the city, numbering about 34,000, have been put into mosquito-proof condition. They have all been numbered. They have also been provided with proper means of access with the exception of a very few cases in which necessary action has been taken. It is natural that some minor defects should occur in the cisterns occasionally, but immediately after such defects are noticed action is taken to get them remedied.

Out of 211 non-mosquito-proof overhead tanks in 1928, 207 tanks are now in mosquito-proof condition. The remaining four tanks are under action.

Mill ponds.—These are oiled regularly and kept free from mosquito breeding. They are not of much consequence from the point of view of malaria prevention, as they are very rarely found breeding *Anopheles stephensi*.

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Fountains, garden tanks and tubs.—These are emptied and kept dry for 24 hours regularly once a week. Fountains have also been connected with drains.

The stand pipes and the hydrants at the Malabar Hill reservoir are attended to.

Cellars.—Almost all the cellars have been made water-tight, and those few which have not yet been made water-tight are kept treated with saponified cresol.

Water used in building construction.—A systematic record of all the buildings under construction has been maintained and water used in connection with such buildings is treated with saponified cresol.

Temporary breeding places.—The measures recommended under this heading are duly put into practice.

Special breeding places.—The Bhuleshwar tank has been filled in, the sluice cabins at Bhandarwada reservoir have been graded and drained, the doors of the Malabar Hill reservoir have been made mosquito-proof and the seepages from the reservoir and other places are regularly examined for breeding and treated.

The grass farm between Elphinstone Road and Dadar has regularly been treated with Paris green, and *Anopheles stephensi* have never been found in this farm since Major Covell's report.

Victoria Gardens.—The number of masonry tanks has been reduced, in consultation with the superintendent of the Gardens, to the minimum requirements; the tanks that are allowed to remain are frequently inspected, and breeding of mosquitoes therein is controlled.

The next point in Dr. Dalal's letter is that the malaria branch does not do anti-malaria work but anti-mosquito work. I agree with him that we do anti-mosquito work, but as all the possible breeding places of malaria-carrying anopheles are regularly attended to, what is there to object to? The other varieties of mosquitoes are equally a source of nuisance and since people do not like to be bitten by culex or stegomyia, their breeding places have to be attended to. I remember an instance where Dr. Dalal complained to me about a nuisance from culex mosquitoes and I had to get the place attended to. He would not have been satisfied if I had told him that the mosquito was not a malaria carrier.

Dr. Dalal is wrong in saying that "no attempt is made to single out *A. stephensi* breeding places," and a visit to the office of the malaria officer would satisfy him.

Unitary control is no doubt desirable, but much work can be done even before the unitary control is secured. We are not infallible, and Dr. Dalal's advice is welcome; but before he rushes into print, will he visit either the malaria office, or my office, and find out whether or not "we in Bombay are attempting to tackle our malaria problem?"—Yours, etc.,

J. S. NERURKER, B.SC., L.M. & S., D.P.H.,
Executive Health Officer.

BOMBAY MUNICIPALITY,
BOMBAY,
18th June, 1931.

DISTRIBUTION OF QUININE IN JHELUM DISTRICT IN 1930.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Since the coming into existence of the newly organised Punjab Public Health Department in 1923 extensive and elaborate arrangements have been made, from year to year, for the distribution of quinine free of cost for the relief of the malaria-stricken people in almost all the districts of the Punjab. Previously also it was the custom to distribute quinine gratuitously. Since quinine is a Western drug the use of it, like other drugs, could not be made popular except by this method of free distribution. The result of this method in some areas has been that quinine has become very popular; in those in which a conscientious interest was taken by the officials distributing quinine the people simply clamour for quinine during the malaria season, but in others on the other hand quinine is simply hated as is the distributor of quinine.

In Jhelum it was considered that enough trial has been given to the method of free distribution of quinine and that it was high time that people should start paying for quinine, the value of which had been demonstrated to them from year to year. Accordingly it was decided to organise the sale of quinine in the rural area of the Jhelum district. Centres were established in 80 villages; besides vaccinators, sanitary inspectors, the District Medical Officer of Health and the Deputy Commissioner sold quinine at cost price in the villages visited by them. Quinine was also kept for sale in the office of the District Medical Officer of Health, the district community council office and in the tahsil offices of Chakwal, Jhelum and Pind Dadan Khan. To make the sale of quinine attractive quinine was put up in pill boxes of different sizes containing 4, 8, 16 and 32 tablets, costing 1, 2, 4 and 8 annas, respectively. Each pill box carried on its top the picture of a mosquito, just to teach people that mosquitoes spread malaria.

The sale of the quinine did not become at all popular because, firstly, it was the first year of the experiment of this type, secondly, people are not used to paying for medical aid, thirdly, there was not much malaria this year (I am sure all the quinine would have been sold if there had been an epidemic of malaria), and fourthly, most of the people are poor and some could hardly afford to purchase quinine.

People still view the gratuitous distribution of quinine with suspicion; they think the Government is out to kill people with quinine tablets, as they kill dogs and rats with pills. I know personally cases in which quinine was definitely and rudely refused, though the patient was suffering from severe malaria, because they believed that it was not to do good, but harm, to them that quinine was offered free of cost.

In spite of the fact that the experiment of distribution of quinine on payment was not at all a success, I would suggest that it will have to be tried for several years before it can gain popularity. Quinine should be sold at a low rate, half a pice per tablet of 5 grains. People should be educated to purchase quinine. It is only in this way that they will learn to value this priceless drug. Medical aid, or anything, given free of charge is bound not to be valued at all.

This year only those people purchased quinine who were a bit educated. So far as the district board members are concerned, with what great reluctance did they purchase even two-rupees-worth of quinine each, whereas in previous years, unless a full tin of quinine containing 500 tablets was supplied to each member, they would curse and complain that the health officer eats away the whole lot of quinine.

In conclusion, it may be said that this method of distributing quinine has the advantage that if the people purchase quinine for use, we can be certain they will use it; in the free distribution, on the other hand, quinine in some cases is thrown away by the ignorant people and never used.—Yours, etc.

J. R. CHAUDHRI, M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (Cantab.),
District Medical Officer of Health.

JHELUM,
2nd February, 1931.

DIATHERMY IN PNEUMONIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the July 1931 issue of your *Gazette* I find in the correspondence columns that Dr. N. N. Das would like to be enlightened about the usefulness of diathermy in pneumonia cases.

The usefulness of diathermy in these cases is now an established fact and this form of treatment is being used in most of the American and Continental hospitals as a routine measure. I have tried diathermy in several cases of pneumonia with uniformly satisfactory results. The improvements I found were quite in accord with

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MALARIA CONTROL BY ANTI-MOSQUITO MEASURES

BY

GORDON COVELL

M.D. (Lond.), D.P.H., D.T.M. & H. (Eng.), Major, Indian Medical Service

Assistant Director, Malaria Survey of India.

Since the immense importance of the rôle played by mosquitoes in the transmission of disease has come to be generally recognised, the literature dealing with the application of various anti-mosquito measures has become so extensive that it is difficult for the average malaria worker to keep in touch with the different methods advocated. In this book an endeavour has been made to give some account of these methods in a convenient form.

CONTENTS.

Part I.—Protection against bites of Mosquitoes.

Mosquito Nets; Mosquito Boots; Veils, Gloves and Hand-fans; Repellents or Culicifuges; Screening of Houses and Barracks.

Part II.—Measures Directed against Adult Mosquitoes.

1. Destruction by Hand: Hand-nets; Swatters; Chloroform Tubes; etc.
2. Traps.
3. Fumigation.
4. Sprays.
5. Jungle-clearing.
6. Cultivation of Alleged Deterrent Trees and Plants.
7. Use of Bats.
8. Zooprophylaxis (Animal Prophylaxis).

Part III.—Measures Directed against Larvæ of Mosquitoes.

A. Description of Methods Used.

1. Jungle-clearing: Where useful, where dangerous.
2. Drainage: Open Drainage; Subsoil Drainage; Vertical Drainage.
3. Oiling.
4. Chemical Larvicides; Paris Green; Stoxal; Cresol; Cyllin, etc.
5. Sulphate of Copper.
6. Vegetable Larvicides: Derris; Cactus Paste; etc.
7. Larvicidal Fish.
8. Deterrent Aquatic Plants.

B. Methods Advised in Special Circumstances.

C. Biological Control of Mosquito Breeding.

Appendix.—List of Sources and Prices of Anti-Mosquito Apparatus.

Bibliography of 570 references to Literature, arranged under headings of the different subjects.

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the results obtained by American and Continental workers in this line.

It is not possible to give any definite idea about this method of treatment in a few lines.—Yours, etc.,

B. N. C. ROY, M.B.

89/6, RIPON STREET,
CALCUTTA,
29th July, 1931.

INFANTILE BILIARY CIRRHOSIS AND ARTIFICIAL FEEDING OF INFANTS IN INDIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I am sending herewith a copy of a letter received from Dr. U. Krishna Rau, M.B., B.S., Editor of the *Antiseptic*, Madras.

20th July, 1931.

"DR. S. B. GOTHOSKAR, M.B., B.S.

DEAR DOCTOR,

Yours of the 16th instant.

The habit of diluting cow's milk, then boiling it and taking off the cream before administering it to children is a common practice in these parts. With the advent of dairies nowadays, milk from which cream is taken away is being offered for sale and many people buy it.—Yours truly,

(Sd.) U. KRISHNA RAU."

Dr. S. P. Bhattacharji says in his note on my article in the June number of the *Indian Medical Gazette*, "In Bengal I have seen a very large number of cases of infantile biliary cirrhosis and also cases in Madras, but have never found such a definite history of fat deprivation."

You will see from the enclosed letter the practice that prevails in Madras. I should like to know the practice in Bengal.

Milk from which cream is taken away may not be completely fat-free, but certainly it is very much below the standard.

I do not think that the disease ever occurs among European children. Their mothers know too well the importance of cream and the proper method of giving milk.

I hope I shall be excused for troubling you again as the point at issue is of the greatest importance to all Indians, the disease being so much dreaded in most Indian families.—Yours, etc.,

S. B. GOTHOSKAR, M.B., B.S.

CERTIFYING SURGEON'S OFFICE,
AHMEDABAD,
24th July, 1931.

HILUM TUBERCULOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have read Dr. Y. G. Shrikhande's letter in your last issue with interest and hasten to reply. His letter records several valuable facts, and expresses opinions for which I have great respect.

Dr. Shrikhande considers that the grounds on which the existence of hilum tuberculosis has been assumed are insufficient. He appears to object to my definition of hilum tuberculosis. He himself mentions a couple of definitions of which he summarily disapproves. He has not said what pathological lesion or lesions are included or understood by the term hilum tuberculosis.

I feel certain that Dr. Shrikhande will have seen that I mentioned that hilum tuberculosis as understood by the radiologist always included the pathologists' and the anatomists' hilum, and further that my diagnosis was based on sputum examination and other circumstantial evidence, and not on the exaggeration of shadows alone.—Yours, etc.,

R. N. TANDON, B.SC., M.B.B.S., D.M.R.E. (Cantab.), T.D.D. (Wales),
Medical Officer-in-Charge.

BALRAMPORE HOSPITAL,
LUCKNOW,
21st July, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Colonel H. M. Mackenzie has been appointed as Honorary Surgeon to H. E. the Viceroy.

Lieutenant-Colonel A. Denham White, on return from leave, is appointed as Civil Surgeon, 24-Parganas.

The services of Major J. R. D. Webb, O.B.E., have been placed temporarily at the disposal of the Government of Madras with effect from 10th August, 1931, for employment as Director of Public Health.

The services of Major J. E. Ainsley have been placed temporarily at the disposal of the Central Provinces Government with effect from the date on which he assumes charge of his civil duties.

Major S. Nag is appointed as Civil Surgeon, Murshidabad, with effect from the date on which he takes over charge, *vice* Major N. C. Kapur, transferred.

The following appointments have been made:—

To be Captains (Provl.) (on probation)

Manoranjan Sen Gupta, dated 10th February, 1931, with seniority from 2nd November, 1926.

Devendra Nath Chakravarti, dated 10th February, 1931, with seniority from 10th December, 1927.

Tolaram Bhajsingh Pahlajani, dated 18th December, 1930, with seniority from 15th June, 1929.

Assa Singh, dated 10th February, 1931, with seniority from 20th November, 1929.

Subbier Annaswami, dated 10th February, 1931, with seniority from 10th February, 1930.

Sangham Lal, dated 10th February, 1931, with seniority from 10th February, 1929.

Khurshed Jilani, dated 10th February, 1931, with seniority from 26th July, 1929.

Dewan Pitamber Nath, dated 10th February, 1931, with seniority from 21st May, 1930.

Bashi Lal Taneja, dated 10th February, 1931, with seniority from 19th November, 1930.

Hoe Min Sein, dated 10th February, 1931, with seniority from 26th January, 1931.

Humayun Hassan Mahmood, dated 10th February, 1931.

LEAVE.

Lieutenant-Colonel N. S. Sodhi, Civil Surgeon, Lahore, has been granted leave for two months with effect from 20th July, 1931.

Lieutenant-Colonel R. T. Wells, Civil Surgeon, Rawalpindi, has been granted leave for six weeks with effect from 19th July, 1931.

PROMOTIONS.

The promotion of Major R. A. Warters to the rank of Major has been ante-dated to the 12th July, 1927.

The undermentioned Lieutenants have been promoted to the rank of Captain with effect from the dates noted against their names:—

L. F. Burns, dated 7th March, 1930.
L. Dass, dated 18th August, 1930.
P. C. Dutta, dated 5th November, 1930.
E. A. O'Connor, dated 30th April, 1931.

Lieutenant J. H. Boultbee has been promoted to the rank of Captain (Provl.) with effect from the 29th April, 1931.

RESIGNATION.

Lieutenant R. A. Paton has resigned the service with effect from the 16th April, 1931.

RELINQUISHMENT.

Captain E. P. Carroll has relinquished his probationary appointment with effect from the 17th June, 1931.

RETIREMENTS.

Lieutenant-Colonel J. Cunningham, C.I.E., has retired from the service with effect from the 2nd June, 1931.

Lieutenant-Colonel J. R. J. Tyrrell, C.I.E., has retired from the service with effect from the 14th June, 1931.

Lieutenant-Colonel F. P. Warwick, D.S.O., has retired from the service with effect from the 26th July, 1931.

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Notes.

HEIDELBERGER FREMDENBLATT.

WE have received a copy of a special English edition of the *Heidelberger Fremdenblatt*. This large, beautifully-illustrated magazine is the official organ of the town of Heidelberg. Its range of interests is, however, the whole of Rhineland. To anybody who has made that wonderful voyage down the Rhine, this magazine will appeal as a souvenir, and those who have not will certainly be encouraged to make it. This country has a special appeal to the medical man on account of its numerous spas and its educational facilities.

On receipt of the postage the Editor, *Heidelberger Fremdenblatt*, 23, Hauptstrasse, Heidelberg, will be pleased to send free copies to applicants.

IDOZAN.

SIR WILLIAM OSLER says, in his *Principles and Practice of Medicine*, "The treatment of chlorosis affords one of the most brilliant instances—of which we have but three or four—of the specific action of a remedy. Apart from the action of quinine in malarial fever, and of mercury and iodide of potassium in syphilis, there is no other drug the beneficial effects of which we can trace with the accuracy of a scientific experiment. It is a minor matter *how* the iron cures chlorosis. In a week we give to a case as much iron as is contained in the entire blood..... In studying charts of chlorosis, it is seen that there is an increase in the red blood corpuscles under the influence of the iron, and in some instances the globular richness rises above normal. The increase in the hæmoglobin is slower and the maximum percentage may not be reached for a long time..... An important feature in the treatment is to persist in the use of the iron for at least three months and, if necessary, subsequently to resume it in smaller doses, as recurrences are so common."

In India there are many conditions of anæmia other than chlorosis in which iron is a valuable remedy.

Idozan is a colloidal neutral iron solution containing 5 per cent. of iron. The makers claim that by means of relatively small doses of Idozan it is possible without any inconvenience to the patient to give much larger doses of iron than can be accomplished with any of the other existing preparations, and to reach the same ingestion of iron, with Blaud's Pills for instance, one would have to give the patient 90 pills a day. Idozan, they say, does not cause constipation and it does not discolour the teeth.

The following is an extract from a report on Idozan in the *British Medical Journal*, December 9th, 1922:—"Idozan is stated to be a neutral preparation, containing 5 per cent. of iron in a non-irritant form, which is readily dissociated to liberate ionized iron. Our examination showed that Idozan had a sweetish taste and did not produce any astringent effect in the mouth, even when tasted undiluted. It was found to contain 5 per cent. of iron in a non-ionized form, and ultra-filtration tests showed that at least 97 per cent. of the iron was present in colloidal form. Free iron is slowly released on warming with dilute acids, and therefore the iron should leave the stomach in a form in which it can be assimilated. Idozan is therefore a concentrated non-irritant preparation of iron very suitable for therapeutic administration, particularly when it is desired to give large doses of iron."

TREATMENT OF PRURITUS VULVÆ WITH GARDAN.

PRURITUS VULVÆ is frequently connected with disturbances of ovarian internal secretion, a reason which induces many physicians to treat it with ovarian preparations, in many cases quite successfully. In cases where a psychic trauma exists psycho-therapy may be of avail. Some time ago Winkler (*Wien. med. Woch.*, 1929, Nr. 25) mentioned the anti-pruritic properties of Gardan, a combination of Pyramidon and Novalgin. Dr. Neuweiler used this product in several cases with good results. Not in every case was a cure brought about, but in the majority there was a marked improvement, which rendered the patients restful again and influenced their general condition. It was not necessary to increase the dosage. Usually one tablet produces an effect lasting many hours. Comparatively often even half a tablet brought about the desired result. Increase of dosage to 1½ or 2 tablets was borne without ill effects. Gardan seems to be a reliable anti-pruritic. Of course the therapy must not be confined to Gardan only, but ætiological factors must be considered: diabetes or ovarigenous pruritus (climacteric, leukoplacia, menstrual troubles). In cases where the ætiology is not clear, treatment with Gardan alone is indicated (*Schweiz. med. Woch.*, 1930, Nr. 44).

PLASMOQUINE IN THE TREATMENT OF QUININE HÆMOGLOBINURIA IN MALARIA.

IN a 7-year old child, who stood Euquinine quite well, quinine tablets produced marked hæmoglobinuria. A daily dose of 0.02 gm. Plasmoquine brought about the disappearance of the symptoms within 3 days, which was followed afterwards by complete cure without complications.

A severe attack of blackwater fever was observed in a 42-year-old male patient, who habitually took quinine for repeated attacks of malaria. 0.06 gm. of Plasmoquine was administered *per diem* and symptoms of hæmoglobinuria disappeared after 3 days. Treatment was continued with smaller doses of Plasmoquine.

Another case offered the same features. But here Plasmoquine was injected (3.2 c.c.). One month after stopping Plasmoquine medication he took 2 tablets of quinine whereupon hæmoglobinuria was observed again. His general condition became worse accordingly. Repeated Plasmoquine injections gave rapid improvement. In all these 3 cases Plasmoquine was remarkably well borne by the patients in spite of their quinine idiosyncrasies (*Giorn. Clin. Med.*, XII, 874).

PURITY OF DRUGS.

IN view of the evidence given before the Indian Drugs Enquiry Committee with reference to the difficulties encountered by medical men in obtaining pure chemicals in India, the fact that there is now available at the Bombay depôt of the British Drug Houses a supply of chemicals of a standard of purity recognised in the pharmacies throughout the British Empire as being the highest obtainable, is a matter of general interest to physicians in India.

The standard to which we refer is denoted by the letters "P. P. P." which signify "Pure for Pharmaceutical Purposes"—a standard originally adopted by the British Drug Houses and their predecessors 25 years ago at a time when it was recognised that the official standards for many of the chemicals used for dispensing purposes were inadequate. To-day, these letters, restricted to the pharmaceutical chemicals manufactured by the British Drug Houses, are universally regarded as a comprehensive guarantee of purity and dependability.

Since the first "P. P. P." specifications were published research work has been continuously carried out in the B. D. H. laboratories with the result that the original series of "P. P. P." chemicals has been greatly extended, and now practically every one of the more important chemicals used for dispensing purposes manufactured by the British Drug Houses is issued with the "P. P. P." guarantee.

The comprehensive description "Pure for Pharmaceutical Purposes" includes freedom from chemical impurities and freedom also from foreign substances

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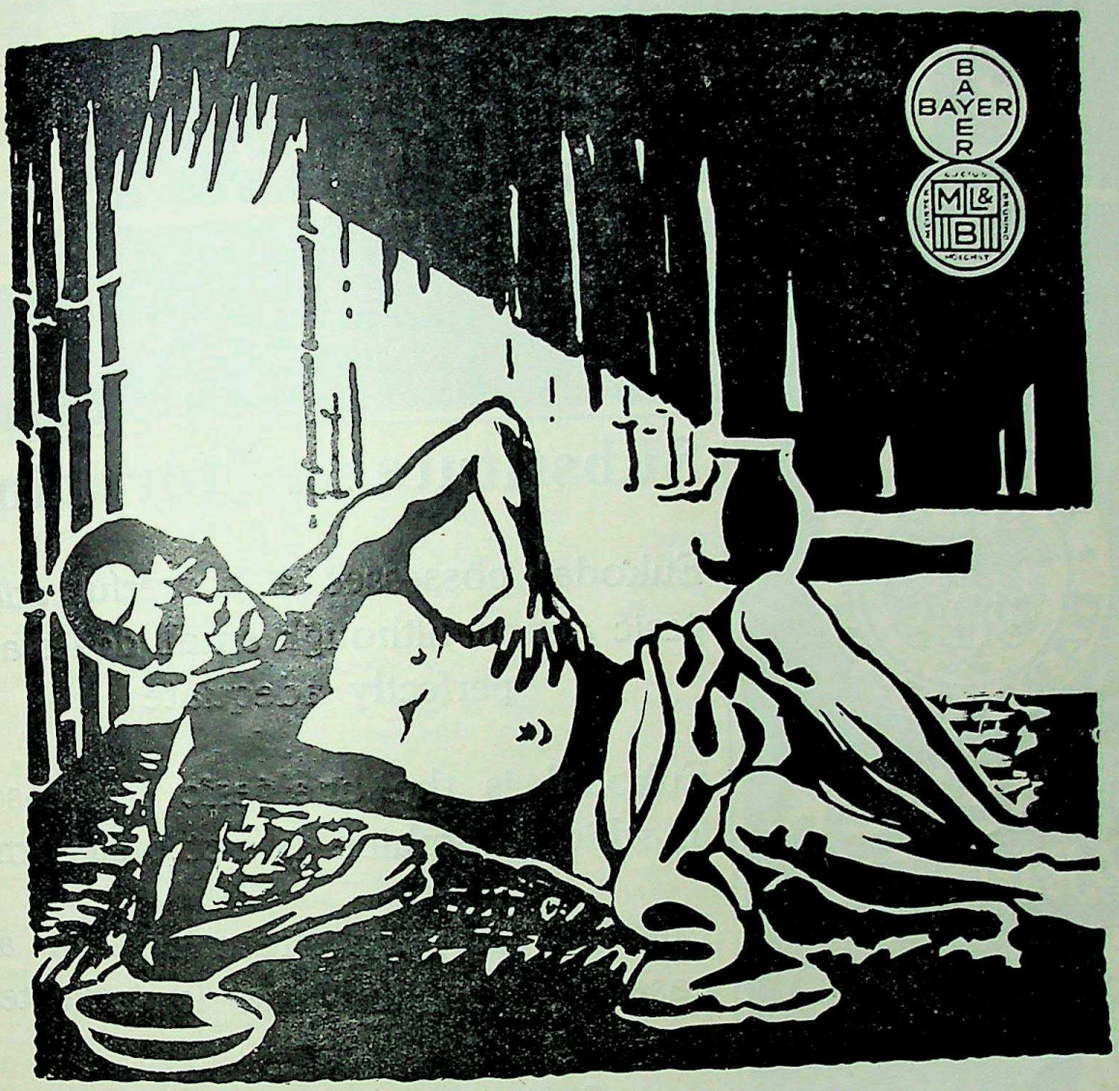
"Bayer-Meister Lucius"



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Eukodal may be prescribed in all cases where morphine is indicated

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Eukodal Tablets, of 0.005 gm. in tubes of 10 and 20.

Eukodal Ampoules, of 0.01 gm. in 1 c.c., in boxes of 5 and 10.

Eukodal Ampoules, of 0.02 gm. in 1 c.c., in boxes of 5 and 10.

Agents in India:—

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which are conveniently, if somewhat inelegantly, described as "dirt."

It has been recognised that freedom from chemical impurities in pharmaceutical chemicals is of primary importance, especially in respect of the two commonest impurities, *viz.*, lead and arsenic, which are highly objectionable from a physiological standpoint; in this connection a number of communications from the B. D. H. analytical laboratories have been published in various technical journals. Chemicals are peculiarly liable to contamination with lead and arsenic, and pharmaceutical chemicals in every-day use may contain heavy traces of these impurities, the presence of which may well become very undesirable when the dose of the substance containing them is comparatively large. In many cases it has been necessary to devise new manufacturing processes in order to supply products which, in respect of their lead and arsenic content, conform with the perfectly safe limits of the "P. P. P." specifications. Apart from these impurities which are physiologically harmful, there are others, such as traces of iron, which, though innocuous physiologically, may nevertheless be objectionable in that they may cause precipitation, coloration or some other reaction, thereby creating dispensing difficulties.

QUININE TROPOSAN.

ALL medical practitioners with long experience in the tropics will recognise that the administration of quinine is not the one and only remedy in malaria; it requires to be supplemented either at the time or afterwards by hæmatinic drugs such as arsenic and iron. Further, the organic arsenicals, such as Stovarsol may in themselves have a parasiticidal action.

Under such circumstances a combination of quinine and organic arsenic is of interest, and Quinine Troposan, manufactured by Messrs. May & Baker, Battersea, London, S.W. 11, is of considerable interest. It has been favourably reported on by Colonel Sinton, I.M.S., in his clinical studies on the treatment of malaria, whilst two of our patients—one a case of benign tertian malaria, and the other one of quartan malaria—made a sound and rapid recovery on it. The preparation is certainly an interesting one and may prove of special value in the treatment of private patients.

The following are some particulars with reference to Quinine Troposan from Messrs. May & Baker's pamphlet.

"Quinine Troposan is a definite chemical combination of quinine with Troposan, a hydroxy-acetylamino-phenylarsinic acid which is isomeric but not identical with Stovarsol. The product contains approximately 50 per cent. of quinine and 40 per cent. of Troposan. It is supplied in the form of tablets of 0.25 gram for oral administration.

It has been known for many years that arsenic in one form or another is of value in the treatment of malaria, but the effect produced has generally been attributable to the tonic properties of this element and not to any specific action of the compounds on the malarial parasite.

Marchoux, however, in 1925 claimed that Stovarsol (3-acetylamino 4-hydroxyphenylarsinic acid) exerts a definite destructive action against *Plasmodium vivax* the causative agent of benign tertian malaria, the parasites disappearing from the peripheral blood stream in a comparatively short time after administration of the drug. Towards *P. malariæ* and *P. falciparum*, Stovarsol is, however, quite without action.

The observations of Marchoux were confirmed by various other investigators but carefully controlled experiments by Sinton and his collaborators demonstrated that the drug is by itself of very little value in preventing the numerous relapses so commonly met with in tertian malaria. Administered orally in conjunction with quinine, however, the drug appears to be a useful adjuvant to the usual quinine therapy.

Experiments carried out in our own laboratories had led us to the conclusion that the use of Troposan in place of Stovarsol might possibly be more effective in the treatment of malaria, since it appeared to be more active and less toxic than the latter product. We accordingly prepared a compound of Quinine and Troposan (Quinine Troposan) and Colonel Sinton has recorded the results of his observations with the product in the *Indian Journal of Medical Research*, Oct. 1928, Vol. XVI, p. 333.

The general conclusions resulting from the series of experiments described in this paper may be summarised as follows:—

1. The relapse rate which with quinine alone is in the neighbourhood of 65—70 per cent. is reduced approximately 40 per cent. by the suggested method of treatment with Quinine Troposan.
2. Quinine Troposan is practically as rapid as quinine in producing reduction of fever and in causing the disappearance of the parasites from the blood.
3. 60 per cent. of the patients showed a gain of weight during treatment.
4. The rise of hæmoglobin percentage is comparable with that of quinine alone.
5. No deleterious effects were observed in any of the cases treated.

Suggested method of treatment.—Dosage: 3 tablets (each 0.25 gram) three times daily for 14 days, followed by 3 tablets twice daily for 7 days."

BOVRIL, LTD.

PRESIDING at the thirty-fourth annual general meeting of Bovril, Ltd., held in London, on 19th February, Lord Luke of Pavenham (Chairman) said that the directors met the shareholders again with pleasure, and were able to present a satisfactory report and set of accounts.

On the right-hand side of the profit and loss account the gross profit stood at £568,636, as against £603,196 in 1929, a record year. They would note that they charged all advertisements before arriving at this gross profit, and he might say that advertising showed a five-figure excess in 1930 over 1929. They were, however, quite impenitent at having spent this additional sum. They realised that, during a period of depression such as they had been going through, a given amount of publicity could not be expected to give the same results; but they believed it was nevertheless necessary in order to hold their trade until more prosperous times enabled them to make a further advance.

The 1929 home sales surpassed those of 1930, as well as those of 1928, and part of the reason for that was that in 1929 they had a severe influenza epidemic, which always had a marked effect on Bovril sales. When that scourge was about, people would have Bovril, and that was probably why 1931 up to date was ahead of the same period last year. They should, he thought, be satisfied with the fact that they had so well maintained their position, when all around them they heard tales of very large decreases in trade; but having been accustomed, year after year, to report new records, a year without progress was a phenomenon with which they were not familiar.

During the year they had had submitted to them the *American Medical Dictionary*, and, in it, they saw Bovril described as a preparation of meat extract and alcohol. Probably the advertisements of Bovril as a nutrient-stimulant had met the editor's eye, or he had himself noticed its stimulating effect, but it was a little surprising, if he thought it contained alcohol, that he should state it so openly.

Proposing the re-election of the Duke of Athol as a director, Sir James Crichton-Browne, M.D., LL.D., F.R.S., said the Duke brought to the service of the board an honoured name, a large and varied knowledge of affairs, and a genial personality.

Sir James quoted a remarkable instance of the potency of Bovril given in Mr. Leopold Ainsworth's account of his life and activities in the little island of Casuarina, in the Mergui Archipelago, off the coast of Burma. Following a terrible attack of malaria

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Mr. Ainsworth lay unconscious for two days, and was given up for dead. He was being prepared for burial when a friend, fancying he saw some traces of life, administered hot Bovril, and went on giving Bovril every two hours until revival and complete recovery took place. It was, Sir James thought, a remarkable tribute to the world-wide reputation of Bovril that it should have been found ready at hand for such an emergency in that remote tropical island.

RADIOSTOL, B. D. H.

THE history of the research work on vitamine D is not without interest. Hume and Smith in 1926 discovered that rats, when fed on a rickets-producing diet, did not contract rickets when the cages in which they were confined contained sawdust which had been exposed to ultra-violet light. This was due to the rats having eaten the irradiated sawdust, and it was soon demonstrated that unsaponifiable fats in the activated sawdust were the essential element concerned. Finally, it was shown that cholesterol contains an impurity—ergosterol—which, on irradiation, can be activated and which then contains vitamine D. The normal function of vitamine D is to control calcium and phosphorus metabolism, and it is now established that correct calcium and phosphorus metabolism is possible only when the supply of vitamine D is sufficient. This vitamine is normally found in milk, butter, and eggs, but in minute and variable quantities; it is also present in cod-liver oil in greater, but still variable, amounts. It is also produced from minute traces of ergosterol in the skin on exposure to sunlight.

It is claimed for Radiostol, B. D. H., that in it the ergosterol has been irradiated to the optimum point, neither under- nor over-irradiated; it is non-toxic and can be administered according to the directions with absolute safety. The preparation is indicated for the prevention and treatment of rickets, of infantile marasmus, tetany, and spasmophilia; also for the treatment of osteomalacia, wasting diseases in general, and all conditions of faulty calcium and phosphorus metabolism. In pregnancy and lactation Radiostol treatment provides the child with the necessary vitamine D, as well as with calcium and phosphorus provided the intake of these two elements by the mother is sufficient. Radiostol is of special value in the prevention of dental caries, and has also been found of value in supplementing the lead therapy of cancer.

Radiostol is issued in a tasteless solution, and as sugar-coated pellets, both of standardised vitamine D potency, and also in solution in liquid paraffin for external application to wounds. The solution for oral administration is standardised to contain 10,000 anti-rachitic units per c.c., and the pellets 6,000 anti-rachitic units per pellet. The dosage of the former is ½ to 1 c.c. daily as a prophylactic, and 2 c.c. therepeutically; and of the latter one pellet, during or after a meal, once or twice a day.

PROGYNON, SCHERING.

THIS preparation has been put on the Indian market by Messrs. Schering-Kahlbaum "India," Ltd., P. O. Box 2006, 4, Dalhousie Square, Calcutta. It is stated to be a highly concentrated hormone preparation for the stimulation and development of the functions of the female genitalia, and it is also claimed that Professor Steinach, whose work from 1910 to 1920 on the rejuvenation of both sexes is well known, has been associated with the preparation of the new product.

The chief difficulty with preparations of testicular and ovarian extracts when administered orally is that their absorption is uncertain, whilst there is no clear-cut method of demonstrating their effect. Schering-Kahlbaum A.G. claim that Allen and Doisy's test affords a method of biological standardization of Progynon; in this test "the amount of hormone preparation present in a vaginal smear of a castrated mouse showing the histological characters of a complete œstrus, is regarded as a mouse unit." A single dose of one dragee of Progynon is claimed to contain 250 such mouse units. Further, the hormone is stated to be very resistant to heat, alkalies, acids, and ferments. It can also be prepared in aqueous solution for hypodermic administration.

In animal experiments it is claimed that Progynon on hypodermic injection will cause the normal development of the genitalia and secondary sexual characters in female animals castrated in infancy; that it will prevent the sequelæ of castration in adult animals, and will reactivate senile female animals. Clinical studies with the preparation, carried out at Würzburg and Vienna, have shown its value in dysmenorrhœa and oligomenorrhœa. In all conditions of secondary amenorrhœa, even small doses may restore the normal periods. The chief use of the drug, however, is in the treatment of climacteric disorders, where it is claimed that immediate relief of the vaso-motor symptoms is at once obtained, together with restoration of the menses. Interesting accounts of animal experiments with the preparation are included in a brochure, contributed by Steinach, Dohrn, Scholler, and Hohlweg, also clinical accounts of its use by Klemperer, Novak, Last, Batisweiler, and Streck.

Progynon is put up in boxes of 10 dragees, each of 250 mouse units, and the Indian agents will be glad to supply further information on request.

WATSON'S MICROSCOPE RECORD NO. 23.

THE *Microscope Record*, a technical journal published by W. Watson and Sons, has frequently been mentioned in these columns. It always contains articles of considerable interest and of practical value to the microscopist. The May number contains notes on the unbedding of delicate plant tissue, an article on "Insect preparations made without pressure," and another on "Oblique light," all matters of interest to the microscopist whatever microscope he uses. In addition there are detailed descriptions given of some of the special apparatus made by W. Watson and Sons, with notes on how they should be used to the greatest advantage.

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Original Articles.

SEASONAL VARIATIONS OF CHOLERA BACTERIOPHAGE IN NATURAL WATERS AND IN MAN, IN CALCUTTA DURING THE YEAR 1930.

By C. L. PASRICHA, M.A., M.B., B.Chir., M.R.C.S., L.R.C.P., CAPTAIN, I.M.S.,

MILITARY ASSISTANT SURGEON A. J. DE MONTE, I.M.D.,

and

S. K. GUPTA, M.B., D.T.M.

(From the Bowel Diseases Research Department, Calcutta School of Tropical Medicine and Hygiene.)

IN Bengal cholera seasons, as statistics clearly show, recur at the same time each year. In Calcutta there are two seasons, one of two months preceding, and another of two months following, the monsoon rains, that is, in April and May, and in November and December, respectively. The statistics of the last sixty years show very clearly that there is a marked abeyance of cholera activity during the rainy season. High temperature and humidity, stagnation of the air, great range in the diurnal temperature, changes in the subsoil-water levels, and various other explanations have been advanced to account for the seasonal prevalence of the disease. There is undoubtedly some relationship between the meteorological conditions and cholera activity, but the exact nature of this relationship has never been fully established.

Cholera, when introduced into an area, spreads rapidly, persists for a while and then rapidly subsides. d'Herelle and Malone (1927) suggest that the cessation of an epidemic of cholera is due to the spread of bacteriophage from convalescent cases. The virulent cholera vibrio no longer exists as such; a bacteriophage-contaminated avirulent vibrio takes its place and plays an important rôle in the spread of bacteriophage.

Cholera exists in Calcutta throughout the year, although there are two definite cholera seasons which are apparently determined by climatic influences. Conditions for localized epidemics, which d'Herelle and Malone studied and reported upon, do not exist here.

In order to obtain some idea of the prevalence of bacteriophage in Nature and its relationship to the incidence of the disease in Calcutta, samples of water from the river and from 'tanks' were examined throughout the year 1930. Certain tanks were selected with a view to having a representative collection of the natural waters. A uniform technique was employed throughout the year and altogether 385 samples were examined.

Source, frequency and methods of examination.

Samples were obtained mainly from the following places:—

(*i*) Baboo Ghat on the banks of the river Hooghly—a regular bathing ghat.

(*ii*) Dalhousie Square tank—situated in the midst of a modern business quarter; here bathing, etc. is strictly prohibited.

(*iii*) Cornwallis Square tank—situated in an Indian business and residential quarter —open to bathing.

(*iv*) College Square tank—situated in an Indian business and residential quarter —open to bathing.

(*v*) Campbell Hospital tank—situated in the compound of that hospital—bathing prohibited.

Waters from other sources were examined from time to time. Samples were collected by the senior staff of the laboratory in sterile Jena-glass bottles, all contamination being carefully guarded against. At least one sample from each source was examined every week.

On receipt at the laboratory, about a 100 cubic centimetres were added to 10 cubic centimetres of a 10 per cent. solution of peptone water in flat-bottomed flasks; these were incubated overnight. The surface growth was plated on bile-salt agar for vibrios, and the sample filtered through a Chamberland filter. In order to increase the amount of bacteriophage that might be present in the filtrate, a young peptone-water culture of a vibrio, known to be free from bacteriophage and capable of propagating all types of cholera 'phage, was added, and the flask again incubated. After filtration through a candle this second filtrate was tested for the presence of cholera 'phage. One centimetre of a four-hour-old peptone-water culture of a pure vibrio was added to 10 cubic centimetres of papain broth, varying amounts of the filtrate added, and the emulsion immediately spread on an agar plate. Samples showing the presence of bacteriophage were, after passage with a susceptible vibrio, tested for the type or types of cholera 'phage present.

Examination of cholera 'phage in man.

Patients admitted to the Carmichael Hospital for Tropical Diseases were examined for the presence of cholera 'phage in their stools. (No cholera cases are admitted into this hospital.) The stools in 403 cases were examined during the year and the technique employed was similar to that described above.

The results are given in the following table (I), and also in graphic form (figure I). The incidence of cholera is drawn from the monthly rate of admission into the Campbell Hospital (Indian cases) and the Presidency General Hospital (European cases). The meteorological data are from the Meteorological Office at Alipore, Calcutta.

The chief facts to be noted are:—

(*i*) The maximum activity of cholera in 1930 was during the months of March, April, May and June, with an average of 290 cases per month. In July there was a rapid fall and

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TABLE I.

Table showing the seasonal variations of cholera bacteriophages in water and in man in Calcutta during the year 1930, together with the incidence of cholera, and the meteorological data.

Month.	Water.		Man.		Cholera cases (Campbell Hospital).	Cholera cases (Presidency General Hospital).	Cholera mortality, per cent.	Meteorological data.			
	Number examined.	Cholera 'phages isolated, per cent.	Number examined.	Cholera 'phages isolated, per cent.				Mean of daily mean maximum temp. °F.	Mean of daily mean minimum temp. °F.	Rainfall in inches.	Daily mean humidities, per cent.
January ..	57	14	33	9	75	1	34.66	77.6	55.4	0.58	66
February ..	19	5	26	..	126	3	30.64	83.5	61.6	0.77	62
March ..	50	30	20	5	265	5	15.47	93.2	71.0	0.43	61
April ..	40	37	50	6	315	11	19.05	98.1	77.2	0.11	63
May ..	53	11	44	10	298	6	17.11	95.3	78.9	4.66	74
June ..	17	18	39	5	287	8	18.81	93.3	79.5	8.59	81
July ..	41	12	46	2	112	4	17.85	88.8	78.9	20.12	87
August ..	32	..	31	3	38	3	5.27	88.3	79.1	14.67	88
September	23	4	27	..	26	..	3.84	89.7	79.3	7.02	85
October ..	20	..	45	5	40	1	Nil	89.7	76.5	1.08	77
November	14	21	15	..	45	..	6.66	81.5	66.1	2.43	74
December	19	..	27	6	21	..	9.52	77.7	55.8	Nil	67

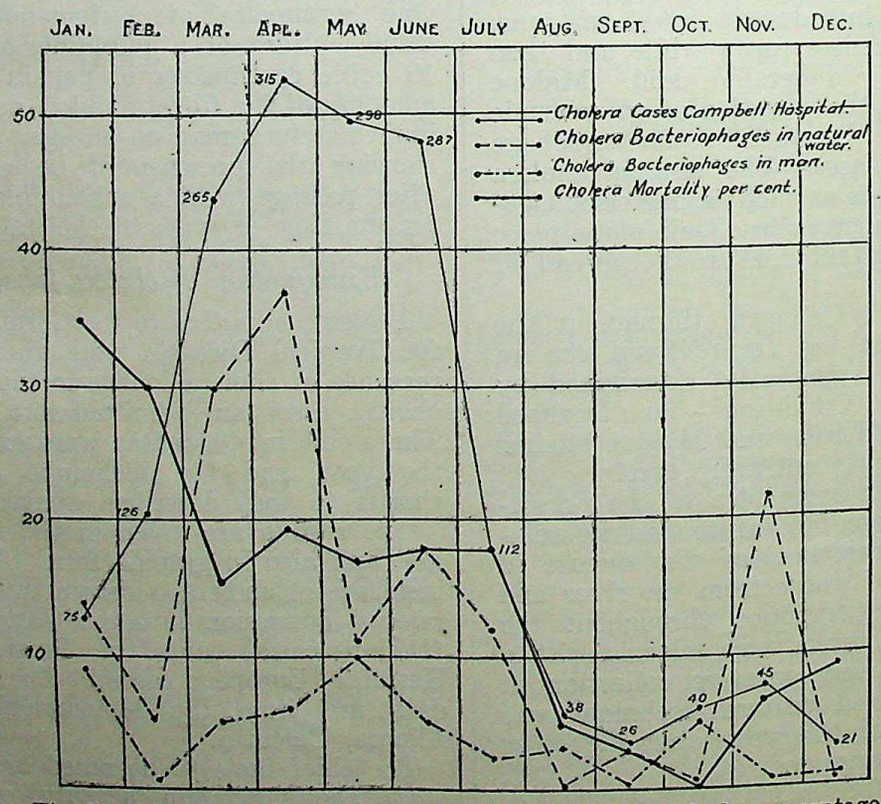

Fig. I.—The seasonal variations of cholera incidence and the percentage mortality, the percentage of waters containing cholera bacteriophages, and the percentage of healthy individuals passing cholera bacteriophages, in Calcutta during the year 1930.

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in August and September there were only 38 and 26 cases, respectively. There was a slight increase in October and November and a fall again in December. The curve of cholera incidence is a typical one.

(*ii*) The meteorological data illustrate the close relationship between cholera activity and rainfall. Once the rains have set in there is a very definite fall in the incidence of the disease. A study of the temperature curves will show that during the months of the greatest difference between the maximum and minimum temperatures cholera is active.

(*iii*) Bacteriophage. The curve of cholera 'phages in waters follows very closely the curve of cholera cases. If we disregard the fall in May (which might possibly be due to some trouble we had in our media during that month) the similarity of the curve is very marked. With the decline of cholera activity there is almost a complete absence of cholera 'phage in waters.

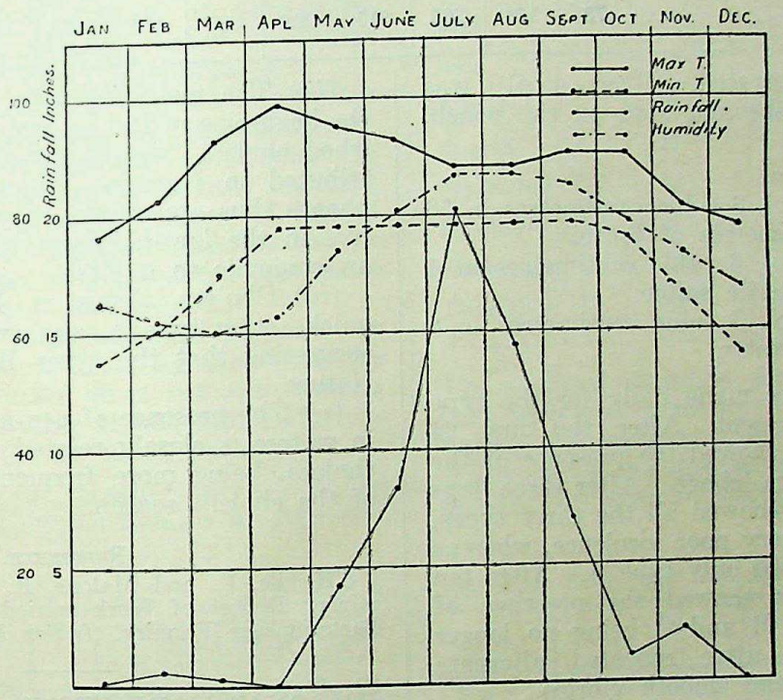
In man, the curve of cholera 'phage runs almost parallel with the incidence of disease, the 'phages present in Nature reaching the maximum a month after the maximum curve of cholera incidence.

(*iv*) The mortality rate. The percentage death rate is high in the beginning of the year, but falls rapidly in March when cholera 'phage becomes widely distributed in Nature. From March to July, although cholera incidence is maximum, the death rate remains low and falls with the decline in cholera incidence.

The cholera 'phages isolated from natural waters.

Out of 385 samples of waters examined during the year 57, or 14.7 per cent., showed the presence of cholera bacteriophage. The type of cholera 'phage present is shown in the following table.

It will be noticed that the majority of the cholera bacteriophages isolated from waters in Calcutta are of the quick-acting type A, which acts only on smooth strains of vibrios. Kind 62A (Asheshov) of type A is the commonest type of cholera bacteriophage present in Nature. Kind 64A type A cholera 'phage was isolated on rare occasions. Bacteriophages types B and C were isolated only in 3 out of the 385 waters examined, and experiments designed to increase any existing cholera 'phage types B and C by growth on rough strains of vibrios, which would propagate these two types and not type A, failed to demonstrate any cholera 'phages of these types in the original filtrates. All



Meteorological data.

TABLE II.

Analysis of the types of cholera 'phages isolated from 385 samples of waters in Calcutta.

Cholera 'phages.	Number of samples of water from which 'phage was isolated.	Percentage of waters containing cholera 'phages.	Percentage of each type of cholera 'phage.
Type A.			
Kind 61 A.	Nil	..	..
Kind 62 A.	52	13.5	90
Kind 63 A.	Nil	..	..
Kind 64 A.	2	0.5	4
Type B.	1	0.2	2
Type C.	2	0.5	4

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types of cholera 'phages must have originally contaminated the waters; either types B and C die out, or our technique was not delicate enough to demonstrate their presence. The following experiment offers a possible explanation.

Cholera stool No. 1325 collected on 9th July, 1931, from a case of cholera on the second day of the disease—agglutinating vibrios present in the stool. The original filtrate of the stool showed type A cholera 'phage only, but after passage with a susceptible vibrio all three types could be demonstrated. The stool was distributed into flasks and kept on the bench, as follows:—

(*i*) Original stool.
(*ii*) Original stool, 3 cubic centimetres in 50 cubic centimetres of broth.
(*iii*) Original stool, 3 cubic centimetres in 4 litres of sterile saline.
(*iv*) Original stool, 3 cubic centimetres in 4 litres tap water.

Examinations were made daily for the type of bacteriophage present. After the first 24 hours all the flasks showed the presence of the three types of cholera 'phage. After three days flasks 1 and 2 still showed all the three types, B and C being of very poor virulence, whereas flasks 3 and 4 showed only type A. After ten days all the flasks showed the presence of type A only, types B and C being no longer demonstrable, even after repeated alternate transfers on rough and smooth vibrios.

This experiment suggests that under natural conditions types B and C cholera 'phages die out.

The cholera 'phages from healthy individuals.—Out of 403 samples examined during the year, 17, or about 4 per cent., showed the presence of cholera 'phage; all were of type A (kind 62A, Asheshov) cholera 'phage, and were all poor races of bacteriophage. We found only 3 vibrio-passers in this series. We could find no association between those passing bacteriophage and those passing vibrios.

The vibrios isolated from water.—We isolated non-agglutinating vibrios from 59 out of 366 samples of waters examined. The following table gives the percentage of water samples containing vibrios each month, and for comparison the cholera incidence taken from table I is also given.

It will be seen that the presence of non-agglutinating vibrios in waters follows very closely the incidence of the disease.

Table III.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Percentage of waters containing vibrios.	13	37	46	17	17	6	5	Nil	Nil	10	21	Nil
Cholera cases	75	126	265	315	298	287	112	38	26	40	45	21

Summary.

(*i*) Cholera in point of prevalence is very intimately related to and dependent upon the climatic and seasonal influences. The heavy rainfall during the monsoon checks the activity of cholera.

(*ii*) Cholera 'phages in Nature vary with the incidence of the disease. It is rare to isolate cholera 'phages from waters during the non-cholera season.

(*iii*) The mortality rate, which is high at the beginning of the cholera season, falls rapidly when cholera 'phages have become widely distributed in Nature. The spread of bacteriophages thus apparently plays a very important rôle in the lowered mortality, and in bringing an epidemic to a close.

(*iv*) Cholera 'phages in Nature are of the quick-acting type A, and evidence is presented suggesting that the types B and C die out in Nature.

(*v*) The presence of non-agglutinating vibrios in waters is closely related to the incidence of cholera, being more frequent at the beginning of the cholera season.

Reference.

d'Herelle, F., and Malone, R. H. (1927). A Preliminary Report of Work carried out by the Cholera Bacteriophage Enquiry. *Indian Med. Gaz.*, LXII, 614.

SEASONAL VARIATIONS OF DYSENTERY BACTERIOPHAGES IN NATURAL WATERS AND IN MAN, IN CALCUTTA DURING THE YEAR 1930.

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Military Assistant Surgeon A. J. de MONTE, I.M.D.,
and
S. K. GUPTA, M.B., D.T.M.
(*From the Bowel Diseases Research Department, Calcutta School of Tropical Medicine and Hygiene.*)

Samples of waters from the river Hooghly and certain tanks were examined throughout the year for the presence of bacteriophages active against *B. paradysenteriæ* (Flexner) and *B. dysenteriæ* (Shiga).

The source, frequency of examination, and the technique employed were similar to that fully detailed in our report on the variations of cholera bacteriophages in Nature, which will be found elsewhere in this number of the *Gazette*.

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Freshly-isolated smooth strains of the dysentery organisms known to be free from any contaminating bacteriophage and lysable by dysentery bacteriophages were employed as the test strains. The filtrates were tested separately with emulsions of the Flexner and Shiga types, but, as the bacteriophages isolated were found to be either active against both types of the dysentery organism or readily adapted to act on both, the results are combined.

Three hundred and eighty-five samples of waters and 403 individuals were examined for the presence of dysentery bacteriophages during the year.

Incidence of bacillary dysentery in Calcutta.

An analysis of the dysentery cases admitted into the Presidency General Hospital during 1930, according to the type of dysentery, amœbic or bacillary, is given below in tabular and graphic form (table I and figure I).

It will be noticed that the increase or decrease in the rate of admission of all types of dysentery varies with the increase or decrease in the number of patients suffering from bacillary dysentery. Thus the total number of admissions into the three principal hospitals can be taken as a fair index of the seasonal prevalence of bacillary dysentery in Calcutta.

The dysentery bacteriophages isolated in natural waters and in man together with the meteorological data are given below in tabular and graphic form (table II and figure II).

The chief facts to be noted are:—

(*i*) The period of greatest prevalence of dysentery was during the months of July and August, *i.e.*, during the rainy season. There is a second rise in dysentery incidence during the cold weather.

(*ii*) Bacteriophages active against the dysentery bacteria can frequently be isolated in natural waters throughout the year. Twenty-four per cent. of the waters examined during the year contained dysentery bacteriophages.

TABLE I.

	Number of cases suffering from dysentery.	Number of cases diagnosed as bacillary dysentery.		
		Clinically only.	Bacteriologically.	Total.
January ..	28	5	6	11
February	13	1	5	6
March ..	7	2	1	3
April ..	14	5	3	8
May ..	11	2	2	4
June ..	13	2	2	4
July ..	29	10	8	18
August ..	27	8	5	13
September	12	2	2	4
October ..	17	3	..	3
November	12	..	2	2
December	13	..	2	2

The seasonal variation shows a close relationship with the incidence of the disease except during the monsoon rains when although the incidence of the disease is at its highest, the number of waters containing bacteriophages is few. This is probably due to the very great dilution and washing away of bacteriophages by the monsoon rains. The change of reaction to the acid side in the waters which occurs after the rains have set in may also

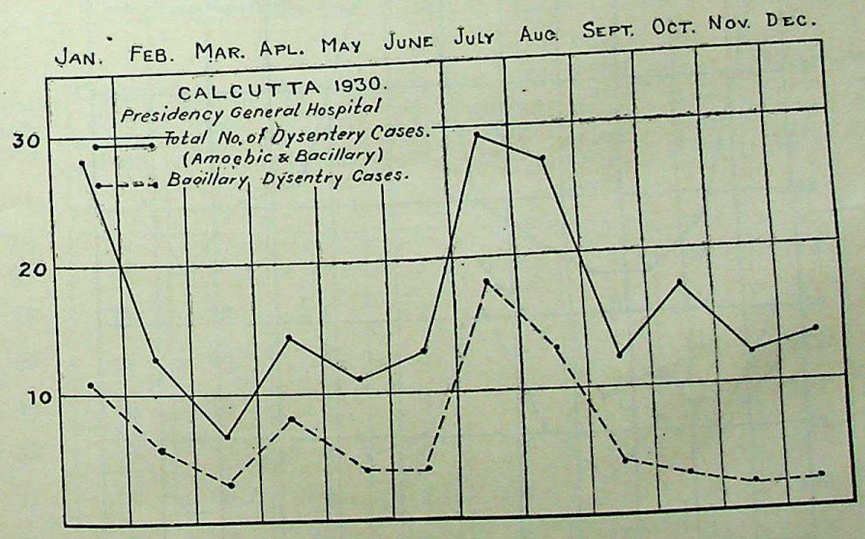

Fig. I.—Seasonal variations in the incidence of bacillary dysentery, compared to the total dysentery incidence (all types).

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TABLE II.

Table showing the seasonal variations of dysentery bacteriophages in waters and in man, together with the incidence of dysentery cases, and the meteorological data.

	Water.		Man.		Dysentery cases per month.				Meteorological data.			
	Number examined.	Dysentery 'phages isolated, per cent.	Number examined.	Dysentery 'phages isolated, per cent.	Campbell Hospital.	Presidency General Hospital.	Medical College Hospital.	Total in the three hospitals.	Average maximum temp. °F.	Average minimum temp. °F.	Mean humidity, per cent.	Rainfall in inches.
January ..	57	38	33	30	55	28	13	96	77.6	55.4	66	0.58
February	19	21	26	19	38	13	5	56	83.5	61.6	62	0.77
March ..	50	22	20	30	34	7	6	47	93.2	71.0	61	0.43
April ..	40	12	50	26	24	14	9	47	98.1	77.2	63	0.11
May ..	53	21	44	36	36	11	6	53	95.3	78.9	74	4.6
June ..	17	41	39	49	40	13	7	60	93.3	79.5	81	8.59
July ..	41	20	46	50	60	29	18	107	88.8	78.9	87	20.12
August ..	32	16	31	29	59	27	7	93	88.3	79.1	88	14.67
September	23	43	27	41	45	12	7	64	89.7	79.3	85	7.02
October ..	20	30	45	9	36	17	8	61	89.7	76.5	77	1.08
November	14	36	15	7	30	12	7	49	81.5	66.1	74	2.43
December	19	24	27	19	48	13	7	68	77.7	55.8	67	Nil.

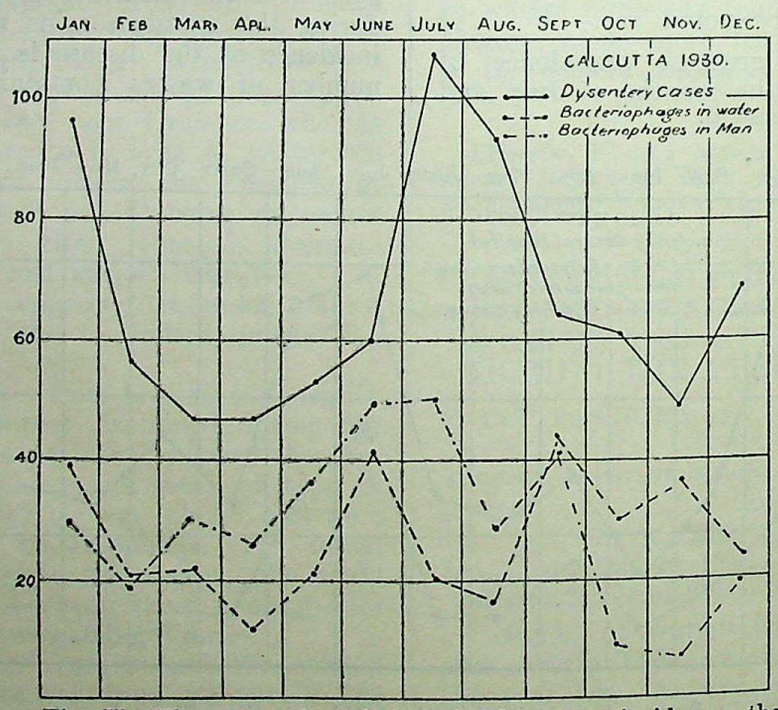

Fig. II.—The seasonal variations in dysentery incidence, the percentage of waters containing dysentery bacteriophages, and the percentage of healthy individuals passing dysentery bacteriophages, in Calcutta during the year 1930.

have a destructive action on the bacteriophage. The *coli* bacteriophage which can be frequently isolated in natural waters also diminished during the rainy months.

(*iii*) Dysentery bacteriophages can frequently be isolated from individuals not suffering from dysentery. Thirty per cent. of the 403 individuals examined in the year were passing

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bacteriophages active against the dysentery organisms. The number of bacteriophage passers varied with the amount of bacteriophages present in natural waters.

The dysentery bacteriophages isolated from the natural waters and from man.—Many of the bacteriophages isolated were of low virulence and soon died out in the original filtrates. The virulence of some bacteriophages could be enhanced to a limited degree, but they never attained the maximum activity. A few races of bacteriophage after repeated transfers on susceptible strains of bacteria were found to possess very great activity and virulence, causing a rapid, complete and permanent lysis of several strains of dysentery organisms. Many races of bacteriophage, even after several transfers on dysentery organisms, possessed virulence of varying degree for heterogeneous bacteria, particularly for some strains of bacteria allied to the dysentery organisms. The secondary colonies that developed after the action of certain recently-isolated races of bacteriophage on *B. paradysenteriæ* (Flexner) were considerably altered in their serological and saccharolytic reactions. An agglutinating Flexner strain under the action of bacteriophage gave rise to secondary colonies which were not agglutinable by Flexner high-titre serum, fermented the same sugars as did the parent strain but with the production of gas, and thus resembled *B. pseudo-carolinus*. Such changes in the characters of a strain can be brought about more readily under the influence of freshly isolated races than by the use of old laboratory cultures of bacteriophage.

SEASONAL VARIATIONS OF TYPHOID BACTERIOPHAGE IN NATURAL WATERS AND IN MAN, IN CALCUTTA DURING THE YEAR 1930.

By C. L. PASRICHA, M.A., M.B., B.Chir., M.R.C.S., L.R.C.P., CAPTAIN, I.M.S.,

MILITARY ASSISTANT SURGEON A. J. DE MONTE, I.M.D.,

and

S. K. GUPTA, M.B., D.T.M.

(From the Bowel Diseases Research Department, Calcutta School of Tropical Medicine and Hygiene.)

SAMPLES of waters from the river Hooghly and from certain tanks were examined throughout the year for the presence of bacteriophages active against *B. typhosus*.

The source, frequency of examination, and the technique employed, were similar to that fully detailed in our report on the seasonal variations of cholera bacteriophages in Nature,

TABLE.

Table showing the seasonal variations of typhoid bacteriophages in water and in man in Calcutta during the year 1930, *together with the incidence of typhoid infection, and the meteorological data.*

Month.	Water.		Man.		Typhoid cases per month.				Meteorological data.			
	Number examined.	Typhoid 'phages isolated, per cent.	Number examined.	Typhoid 'phages isolated, per cent.	Campbell Hospital.	Medical College Hospital.	Presidency General Hospital (Europeans).	Total in three hospitals.	Average maximum temp. °F.	Average minimum temp. °F.	Mean humidity, per cent.	Rainfall in inches.
January ..	57	25	33	18	..	14	6	20	77.6	55.4	66	0.58
February ..	19	15	26	4	1	5	5	11	83.5	61.6	62	0.77
March ..	50	18	20	10	3	6	7	16	93.2	71.0	61	0.43
April ..	40	10	50	8	5	7	7	19	98.1	77.2	63	0.11
May ..	53	6	44	2	3	5	13	21	95.3	78.9	74	4.6
June ..	17	18	39	8	2	6	7	15	93.3	79.5	81	8.59
July ..	41	7	46	26	6	15	11	32	88.8	78.9	87	20.12
August ..	32	..	31	13	9	22	22	53	88.3	79.1	88	14.67
September	23	9	27	4	11	14	14	39	89.7	79.3	85	7.02
October ..	20	5	45	5	7	9	6	22	89.7	76.5	77	1.08
November	14	14	15	..	1	15	2	18	81.5	66.1	74	2.43
December	19	11	27	15	1	7	4	12	77.7	55.8	67	Nil.

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which will be found elsewhere in this number of the *Gazette*.

At first three freshly-isolated smooth strains of *B. typhosus* were utilised as test strains, but later a strain readily lysable by all races of bacteriophage was used as the test strain.

Three hundred and eighty-five samples of water and 403 individuals were examined during the year for the presence of typhoid bacteriophages and the results are given below in tabular and graphic form. The incidence of the disease is drawn from the monthly admission rates for typhoid fever, of the Campbell Hospital, the Medical College Hospital and the Presidency General Hospital.

The chief facts to be noted are:—

(*i*) The period of greatest prevalence of typhoid fever during 1930 was from July to September, that is, during the rainy season.

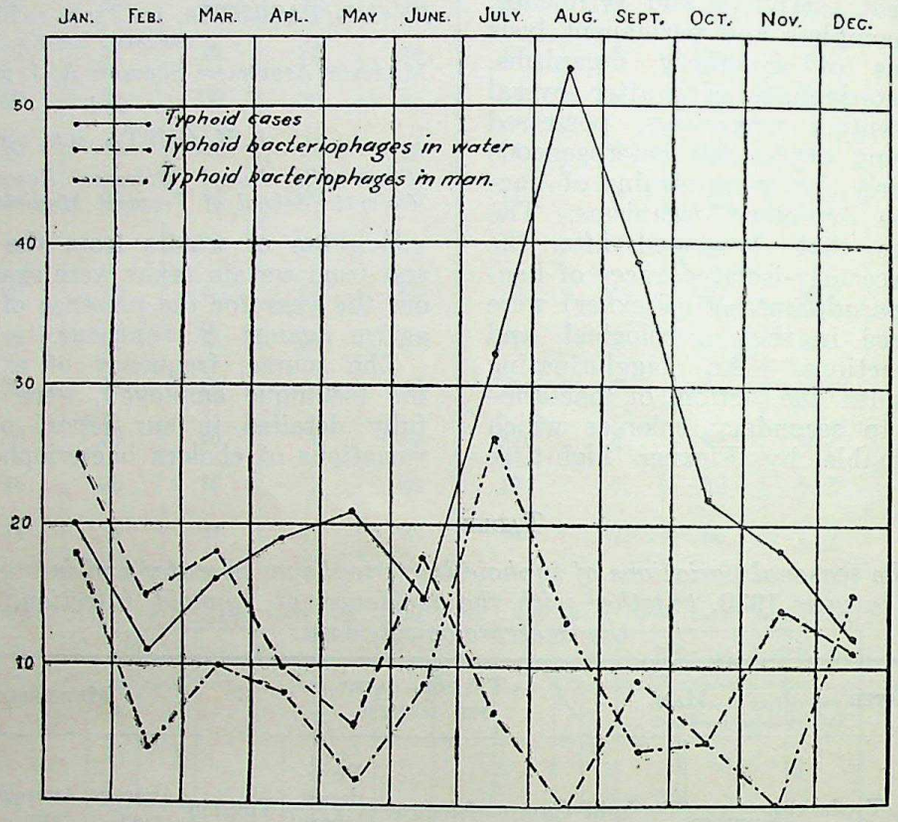
(*ii*) Bacteriophages active against the typhoid bacillus were present in man in a much greater proportion during this period of enhanced typhoid activity.

(*iii*) Typhoid bacteriophages in Calcutta waters could not be isolated during the period of the maximum activity of typhoid, but were frequently found during the rest of the year. Corresponding to the pre-monsoon upward curve of the disease incidence there is a depression in the typhoid-'phages-in-water curve, and with the later increase in the bacteriophages in Nature the incidence of the disease appears to lessen.

Preliminary study of the typhoid bacteriophages isolated.

Forty-six, or 12 per cent., of the 385 samples of water examined in the year contained bacteriophages active against *B. typhosus*. Forty, or 10 per cent., of the 403 healthy individuals were found to be passers of typhoid 'phage. A preliminary examination of these 86 races of typhoid 'phages gave in 12 instances an almost complete and permanent lysis of smooth typhoid strains. By colony isolation of the bacteriophages, 4 types of typhoid 'phage were obtained, differing in their action on smooth and rough forms of the bacteria and in their reciprocal action on the secondary cultures therefrom. Undoubtedly, if further search were made, other types of typhoid 'phage could be isolated. This subject is still under investigation. The lysis in the more potent strains, or in a combination of the different races, is very rapid, a complete lysis being obtained in from 45—60 minutes. Many of the typhoid 'phages isolated possessed a very high virulence for the paratyphoid group of organisms, as well as for several other intestinal organisms.

The administration of the most virulent race of bacteriophages to bacteriologically established cases of typhoid fever of about 10 days' duration caused a fall of the temperature to normal and an improvement in the general condition, within 24 hours of the administration of bacteriophage, in two out of the five cases in which it has been tried so far.



The seasonal variations of typhoid incidence, the percentage of waters containing typhoid bacteriophages, and the percentage of healthy individuals passing typhoid bacteriophages, in Calcutta during the year 1930.

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A SIMPLE METHOD FOR FILLING AMPOULES.

By C. L. PASRICHA, M.A., M.B., B.Chir., M.R.C.S., L.R.C.P., CAPTAIN, I.M.S.,

MILITARY ASSISTANT SURGEON A. J. DE MONTE, I.M.D.,

and

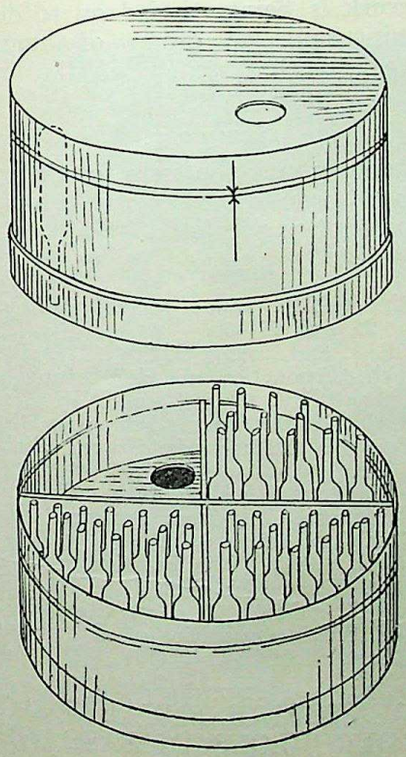
S. K. GUPTA, M.B., D.T.M.

(From the Bowel Diseases Research Department, Calcutta School of Tropical Medicine and Hygiene.)

WRIGHT (1912) described a method for filling ampoules based on the principle of first exhausting the air from the ampoules and then filling by atmospheric pressure. Since then many elaborate pieces of apparatus have been devised based on the same principle, but these are all expensive and not readily obtainable. The modification described below has the advantage that the apparatus required may be found in every laboratory, and the ampoule containers are of such a nature that they can readily be obtained in the market and cost only a few annas each. Thus, a number of ampoules can be filled without the necessity of buying large and expensive apparatus.

THE TECHNIQUE.

Ampoule containers.—These are small aluminium boxes of a kind ordinarily utilised for the storage of food, and are readily obtainable in any market. A box (3 inches by 2



inches) holds about forty one-cubic-centimetre ampoules and a slightly larger one (4½ inches by 3 inches) holds sixty two-cubic-centimetre ampoules, the cost is about 3 and 6 annas, respectively. One with a deep flat lid is selected, and an extra lid obtained to fit the bottom of the box. A somewhat better box with a screw-on lid can be obtained at a slightly higher price. A small hole about one centimetre in diameter is punched through both the bottom of the box and the extra cover which is placed over the bottom. This serves to act as a valve-like opening to the ampoule container. A mark on the side of the box to indicate when the two holes are in apposition helps in the filling. A small sheet of aluminium is arranged inside the box so as to separate off the area in which the hole has been punched out. In the larger boxes, the box is divided by aluminium partitions into smaller compartments for the easy packing and subsequent handling of ampoules (*see* illustration). The ampoules are packed with their mouths pointing towards the lid, and the boxes sterilised.

The requisite amount of the material desired to fill the ampoules is poured by means of a sterile pipette into the ampoule container through the hole in the bottom of the box. The box is now placed with the lid downwards in any exhausting apparatus available—a Bulloch's apparatus is very satisfactory—and the air exhausted. When exhaustion is complete, filtered air is let in and the atmospheric pressure fills the ampoules. The box is turned upside down, so that the mouths of the ampoules are now pointing upwards, and the air again exhausted. In this way the fluid in the necks of the ampoules is emptied, rendering the sealing of the ampoules easy. A number of such boxes may be exhausted for filling at the same time. A hundred ampoules may be filled and sealed by one worker in half an hour and the risk of contamination is negligible.

This form of ampoule container has the disadvantage that larger ampoules than two cubic centimetres cannot be conveniently filled, but serves very well for the commonly used ampoules of one and two cubic centimetres.

Summary.

A cheap and readily obtainable ampoule container is described by the use of which a large number of ampoules can be filled in any laboratory that is equipped with an exhausting pump.

REFERENCE.

Wright, A. E. (1912). *Handbook of the Technique of the Teat and Capillary Glass Tube.*

A NOTE ON THE PRODUCTION OF A CYANOGEN RADICAL IN PEPTONE-WATER CULTURES OF CHOLERA VIBRIO.

By C. L. PASRICHA, M.A., M.B., B.Chir., M.R.C.S., L.R.C.P., CAPTAIN, I.M.S.,

and

S. M. DAS GUPTA, M.Sc.

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DURING the course of some investigations on cholera toxin it was noted that when a solution of ferric chloride was added to a peptone-water

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culture of cholera a definite blood-red coloration was obtained. This led us to suspect the presence of a thiocyanate in the culture and further examination was undertaken.

The peptone water used was a 1 per cent. solution of Difco Bacto-peptone with 0.5 per cent. sodium chloride and a hydrogen-ion concentration of pH 8. Flasks containing 500 cubic centimetres of peptone water were inoculated with cholera culture and incubated at 37° for 72 hours. The culture was then acidified with tartaric acid and distilled. The distillate was received into a weak solution of caustic potash and the following tests as described by Autenrieth (1928) applied to the distillate.

I. Thiocyanate test. This test was found to be definitely positive.

II. Silver-nitrate test. A cheesy precipitate of silver cyanide, soluble in ammonia and insoluble in dilute nitric acid, was obtained.

III. Prussian-blue test. This test gave a bluish-green coloration which on standing for a few hours deposited traces of typical blue on the side of the tube. Although a frank Prussian-blue test for the presence of the HCN was not obtained the reaction is highly suggestive of the presence of small quantities of HCN (Vorländer, 1913).

IV. Vortmann's nitro-prusside test. (Vortmann, 1886). This test gave a greenish-yellow coloration showing the presence of minute traces of hydrocyanic acid (HCN).

The above tests performed with the distillate of uninoculated peptone water were negative in all instances.

A constant stream of filtered air was bubbled through a peptone-water culture of cholera vibrio acidified with tartaric acid and gently heated, and then passed through a weak solution of caustic potash; after four hours the tests were applied to the caustic potash solution. All the tests gave positive results, whereas control experiments—using uninoculated peptone water—were negative.

The stools from a severe case of cholera were distilled, and gave a positive silver-nitrate test.

The above experiments were repeated using 60 strains of cholera vibrio; with the majority of them the tests were positive, though some very old laboratory cultures failed to give the tests.

Cholera-like vibrios.—The following strains were grown in peptone water for 72 hours; the cultures were then tested for the presence of the cyanogen radical.

Peptone-water cultures of *B. dysenteriæ* (Shiga) and *B. paradysenteriæ* (Flexner), *B. typhosus* and *B. coli* gave negative results.

The experimental evidence is sufficient to conclude that some cyanogen radical is formed in peptone-water cultures of cholera vibrio. It may be hydrocyanic acid and in this connection it is interesting to note that Emerson, Cady and Baily (1913), and Clawson and Young (1913) reported the formation of hydrocyanic acid (HCN) by *Pseudomonas pyocyanea* in acid peptone water. The reactions may be

Strain.	Source.	The CN test.
Vibrio 153	Water	Negative.
Vibrio 216	"	"
Vibrio 417	"	Strongly positive.
Vibrio 431	"	"
Vibrio 467	"	Negative.
Vibrio 479	"	"
Vibrio 534	"	Strongly positive.
Vibrio 309	Man	Negative.
Vibrio 633	Clinical cholera	"

due to some organo-cyanogen compound derived either from dehydration of amides or from some amino-acid by decarboxylation followed by oxidation (Dakin, 1916). What substances or which amino-acid is responsible for the production of the cyanogen radical in cultures of cholera vibrio is as yet unknown, and whether these compounds play any part in the symptomatology of cholera is yet to be determined. Further work is being carried on to determine which amino-acid, or group of amino-acids, yields the largest quantity of the cyanogen radical.

Summary.

A substance giving the tests for the cyanogen radical has been detected in peptone-water cultures of cholera vibrio.

References.

Autenrieth (1928). *Detection of Poisons.* Sixth Edition, pp. 26, and 29—31.

Clawson, B. J., and Young, C. C. (1913). Preliminary Report on the Production of Hydrocyanic Acid by Bacteria. *Journ. Biol. Chem.*, Vol. XV, p. 419.

Dakin, H. D. (1916). On the Formation of Cyanides by Oxidation of Amino-acids. *Journ. Biol. Chem.*, Vol. X, p. 319.

Emerson, Cady, and Bailey (1913). On the Formation of Hydrocyanic Acid from Proteins. *Journ. Biol. Chem.*, Vol. XV, p. 415.

Vorländer, D. (1913). The Prussian Blue Reaction. *Berichte Deut. Chem. Ges.*, Vol. I, p. 181.

Vortmann, G. (1886). A New Reaction for the Detection of Small Quantities of Hydrocyanic Acid. *Monatsh. Chem.*, Vol. VII, p. 416.

THE ROENTGENOLOGICAL DIAGNOSIS OF TUBERCULOUS DISEASE OF THE LUNG, IN ADULTS AND CHILDREN.

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Great strides have been made in the last few years in the radiology of the chest. Many

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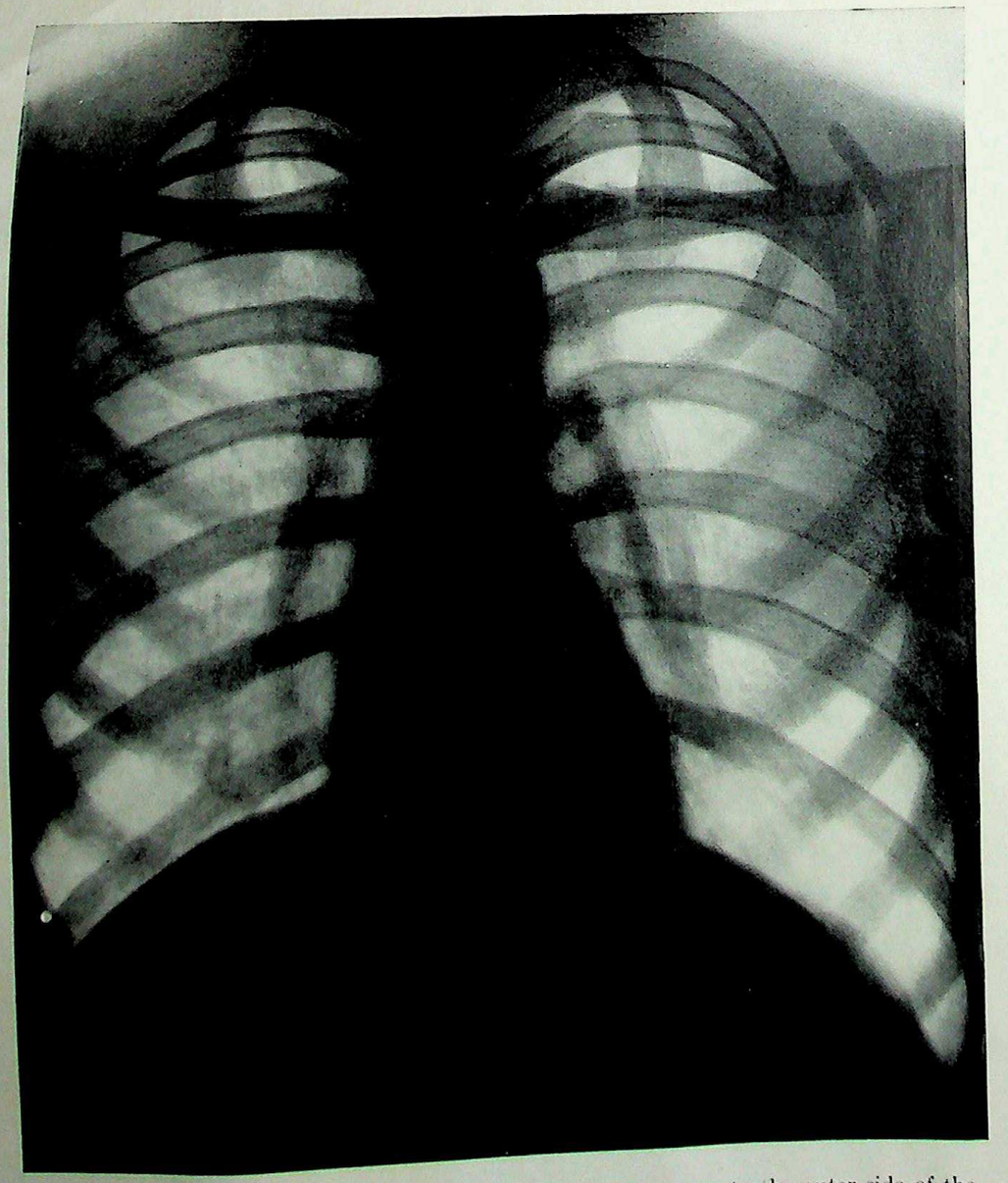

Fig. 1.—Early infiltration is seen in the right sub-clavicular area to the outer side of the middle of the clavicle.

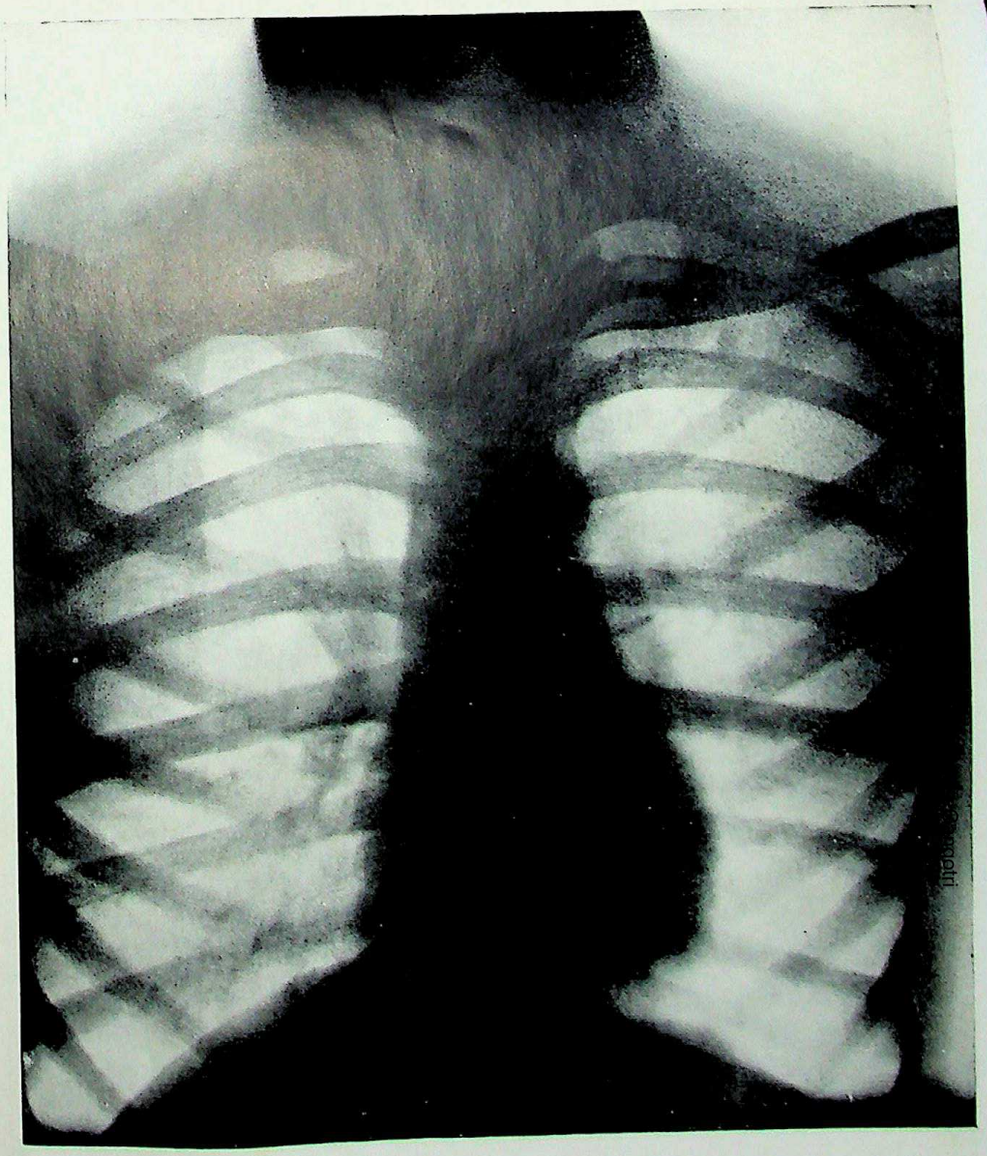

Fig. 2.—A patch of early infiltration is seen just below the left clavicle. Mottling is also seen at the left apex.

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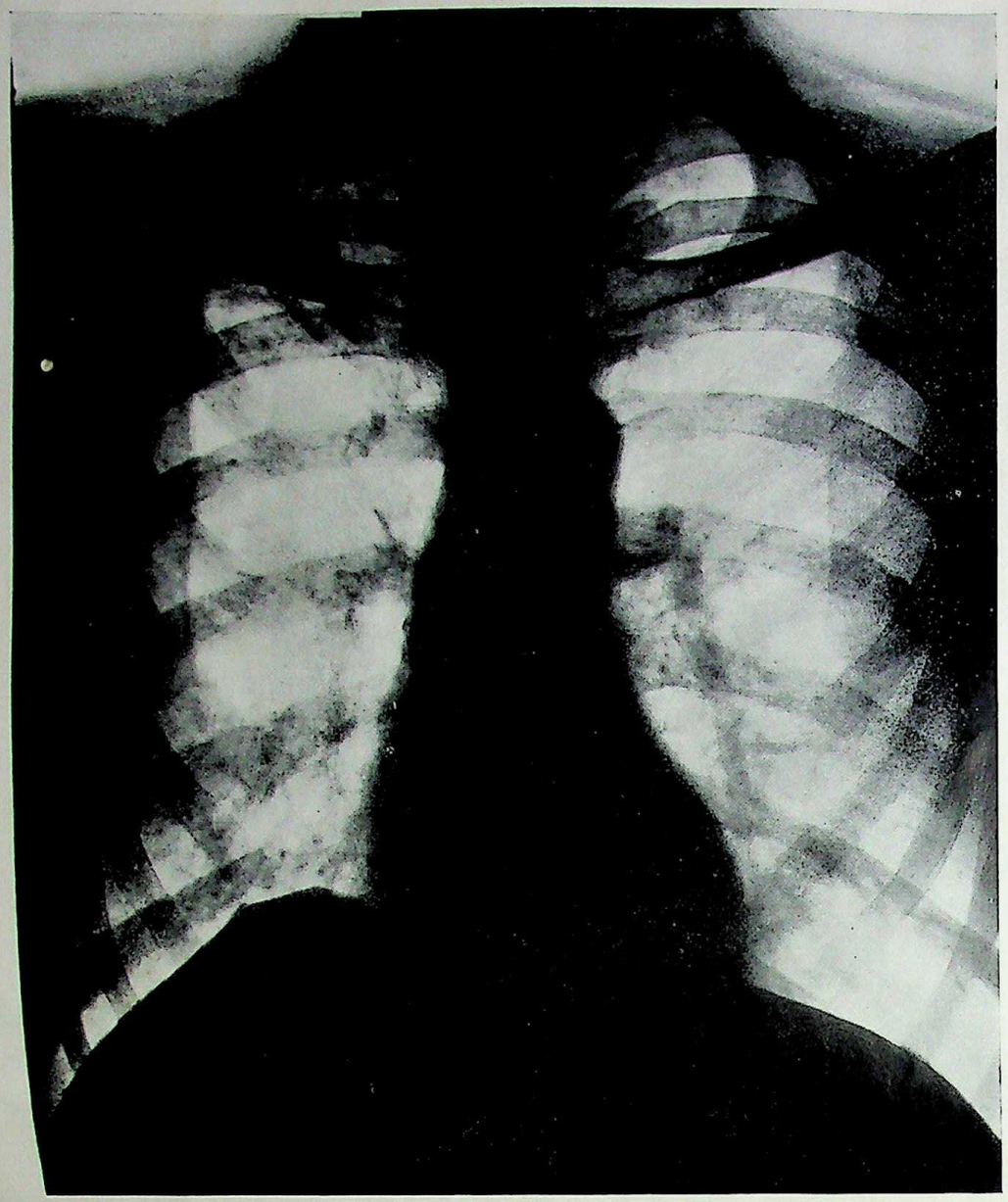

Fig. 3.—More advanced infiltration is seen at the right apex and sub-apical area with early signs of breaking down and cavitation. Very early signs of infiltration are seen at the left apex and sub-clavicular area (to the outer side). Evidence is seen of an old basal pleurisy with "tenting" of the diaphragm on the right side.

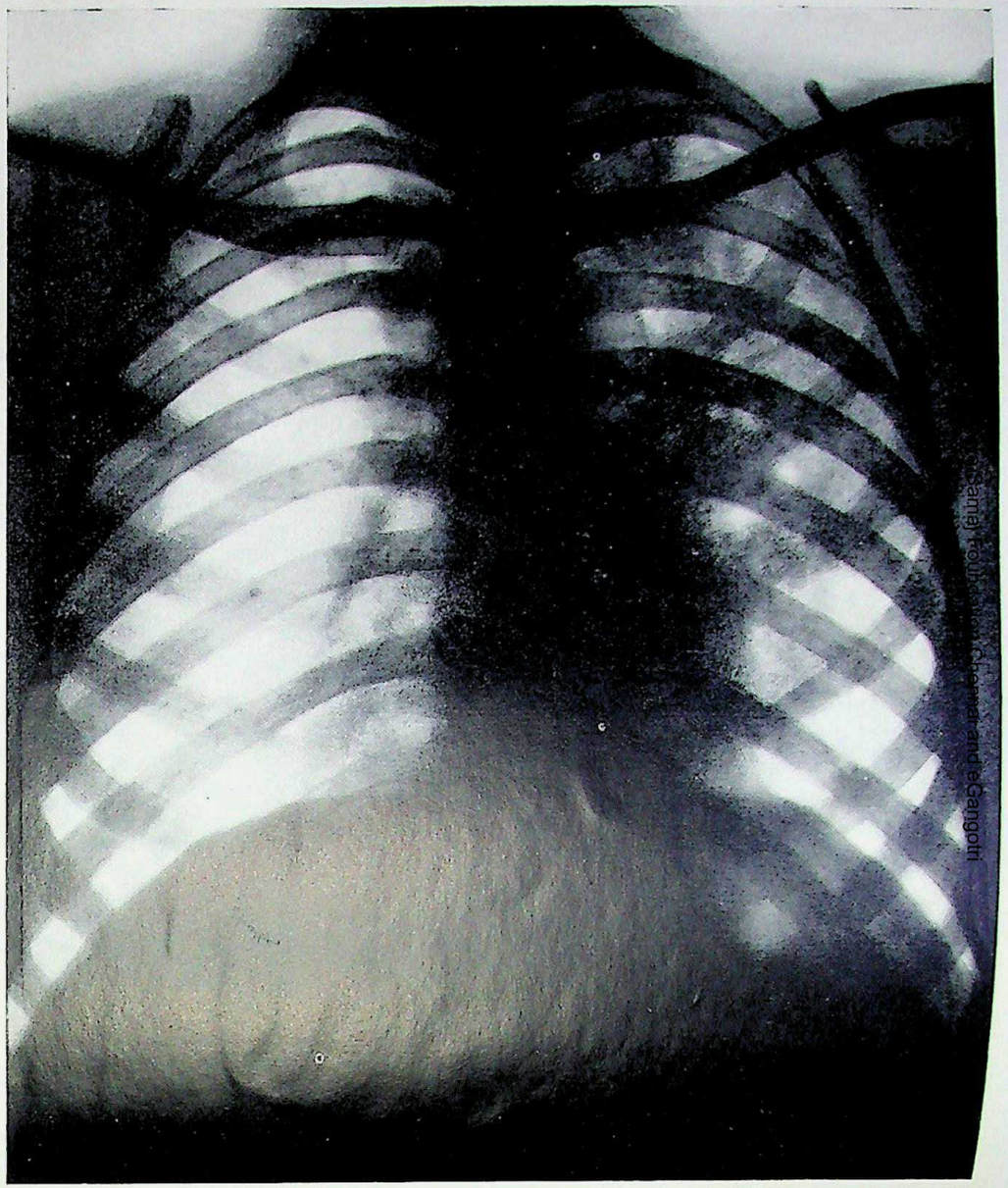

Fig. 4.—Extensive infiltration with cavitation and fibrosis are seen in the left lung, with retraction of the heart towards this side. Early mottling is seen in the right upper lobe. (This will probably be lost on reproduction.)

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conditions are demonstrable in the modern radiogram that very often escape detection clinically; to mention a few, early phthisis, early mediastinal tumours, aneurysms of the thoracic aorta, para-vertebral abscesses and new growths of the lung, both primary and secondary. Improvements in radiological diagnosis have been due partly to improvements in technique and in the case of phthisis to a better understanding of the pathology, the latter in recent years having been built up largely through the agency of radiology (*vide* the work of Assmann and Redekher). As regards technique, in a paper published in the *Archives of the Roentgen Ray* for 1909, Dr. A. C. Jordan, then newly appointed as Medical Radiographer to Guy's Hospital, says "With Lumiers plates, a fully exposed negative of an average chest may be obtained by an exposure of fifteen or twenty seconds, and of an average abdomen in thirty to forty seconds. Most patients are able to hold their breath for this length of time, especially if they have taken a few deep breaths immediately before." A patient I had recently, showed me the scar of a burn he sustained while having a radiogram taken of a suspected fracture of the neck of his femur. The exposure took forty minutes. I wonder what Dr. Jordan would have said if he had to radiograph some of our out-patients at the Medical College, who refuse to hold their breath at all! The paper of Dr. Jordan I quoted from is of further interest as it contains the description of one of the first types of *x*-ray couch used where the tube was protected in a lead rubber box.

With modern apparatus we can take a radiogram of a chest at two metres distance in 1|20 of a second, or even less.

The normal lung.

A wide range of variation is seen in the normal lung. The shape and structure are affected by the habitus of the patient, his surroundings and other factors. As extremes of type, I will mention the squat chest, flattened from above downwards, often seen in people of sthenic stature, and the thin, miserable, spindle-shaped chest so characteristic in people with a tuberculous diathesis. No two lungs agree in the size and arrangement of the pulmonary vessels and bronchi, or in the amount of interstitial tissue present. Many factors affect the appearances seen in the radiogram, such as the type of chest, age, occupation and habits of the patient, and, last but not least, the technique adopted to take the radiogram. Many shadows seen in the lung are apt to be taken for pathological states by the uninitiated, for no branch of radiology calls for more experience than the interpretation of lung radiograms.

The lungs occupy the bony thorax. They are limited below by the diaphragm and separated by the heart and mediastinal structures. The ribs will be readily recognised in skiagrams and need no description when normal. The lung is composed of air cells and a varying amount of interstitial tissue. It is traversed by the pulmonary vessels, bronchi and lymphatics. These all converge at the hilum where as a consequence we get a denser shadow. At the periphery they are more separated giving rise to the "marbled" appearance described by Wessler and Jaches. The hilum contains, in addition to the roots of the vessels and bronchi, a dozen or so lymph nodes and connective tissue. In a normal hilum, which is very rarely seen, the shadow is small, showing some linear markings only, probably due to pleuro-pericardial folds, and bronchial tubes which according to their position appear as fine tubes or small rings with a clear centre almost like small cavities.

Unfortunately, particularly in city dwellers, dust—often germ-laden, the effect of exanthemata such as measles and whooping cough and their attendant bronchitis, and in some cases early tuberculous involvement of the glands during childhood all affect the appearance of the hilum which, in the event of there being fibrosis or even calcification, may throw dense shadows. Sometimes the discrete shadows of bronchial glands are seen. The diaphragm in its normal state is seen as a sharply-defined regular shadow making fairly sharp angles at its junction with the chest wall and the heart—the costo-phrenic and cardio-phrenic angles.

Technique.

Patients should always be examined under the fluroscope. The base of the lungs is first examined, the aperture of the screening stand being cut down to include this only. The movement of the diaphragm is watched. The normal excursion of the diaphragm is about 2 inches, possibly a little more on the right side. Next, the heart action is watched. In febrile states, such as phthisis, an irritable action of the heart, with a rapid rate, will be seen.

Next the apices are examined, the aperture being cut down so as at first to include these and the sub-apical area only. It is important to note the air entry. The filling of the tissues with air will be seen on the screen as a lighting up on deep inspiration. Next the periphery is looked over for any obvious opacities or other abnormal appearances.

The screen examination having been completed the radiograph is done first in the anterior, and where necessary in the posterior, oblique and lateral positions. In the majority of cases the anterior view will suffice.

It is important that a standard technique and uniform positioning should be employed. Where possible skiagrams should be taken with a patient erect. The rays should be centred at the level of the third costal cartilage in the mid-sternal line. An anticathode skin

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distance of one and a half to two metres is generally used nowadays to avoid distortion. At the latter distance the size of structures seen in the radiogram very nearly approximates to the actual. In all cases a fairly soft radiation should be used. Exposure should not exceed one-fifth of a second. A modern refinement, the apparatus for which we now have at the Medical College, consists of stereoscopic radiography showing all the structures in relief.

Pathology.

Ideas on the pathology of pulmonary tuberculosis have undergone many changes in the last few years. In my undergraduate days we were taught that phthisis developed from a small discrete lesion situated in the apical or sub-apical area. This initial ulcer started in the usual way as a grey tubercle and either after a short career was healed, leaving a scar, or broke down to a greater or lesser extent, infecting the surrounding tissues by contiguity or by aspiration, and in this way spreading through a varying portion of the lung. Further breaking down sometimes occurred in places with cavity formation. This view had its inception in the post-mortem room where it was found that about 95 per cent. of cases examined had either completely healed scars or arrested lesions at the apex or sub-apical area. Clinically it was said that the first signs of phthisis were usually to be found in the lung apex, and that the disease slowly spread from the apex to the base. It was later shown in Germany that in a very large number of cases examined in which the presence of an apical lesion was shown, only 7 per cent. developed phthisis. Yet the death rate from the disease was 10 per cent. This discrepancy in figures led to further investigation on the grounds that on the data given the apex was unlikely to be the only starting point of the disease.

The work of Assmann, Redecher and others who examined large numbers of skiagrams of tuberculous patients led to the evolution of many new ideas on the subject. They found that phthisis develops as a small patch of acute broncho-pneumonia, which though often situated in the sub-apical area may be found in any part of the lung field. This initial patch of broncho-pneumonia is in the form of a tuberculous infiltration surrounded by a zone of perifocal inflammation, and in cases where the tendency is to arrest, this in turn may be surrounded by more or less fibrous tissue. These patches of infiltration in many cases show spontaneous healing with the formation of a scar. In others the disease progresses. The changes may be expressed as follows:—

(1) The initial infiltration spreads
  (*a*) by contiguity, or
  (*b*) by small aspiration broncho-pneumonic areas forming around the initial focus.

(2) At the same time the initial lesion may undergo breaking down with caseation, and cavity formation.

(3) While the initial lesion is still in the form of a small broncho-pneumonic patch, a second infiltration—the so-called daughter infiltration—may appear in another part of the lung, probably as an aspiration spread.

This infiltration will naturally follow the same course as the initial one. The progress of these lesions will vary; they may undergo spontaneous healing and fibrose, or they may spread.

Clinically the changes are characterised as follows:—

The initial lesion is usually ushered in by an acute febrile attack sometimes with coughing. This may pass off in a few days and the patient feel well again. In some cases the cough will continue and sputum may be present. At this stage clinical signs may be completely absent and so the case may be wrongly labelled, and the disease rapidly progress with cavity formation. In a number of patients, the lucky ones, the first symptom complained of is hæmoptysis. In many such cases physical signs are completely absent, but skiagrams usually reveal the lesion. In the adult it is probable that most of these cases are due to re-infection from disease originally acquired during childhood.

Many cases, particularly in adolescents, are shown to originate as an interlobar pleurisy. This is first demonstrated by a fine opaque line at the septum. As the course of the case is watched small areas of infiltration may be seen to occur on either side of the septum till in course of time a definite band of infiltration is seen which spreads both upwards and downwards. These are undoubtedly cases of re-infection. It is also equally certain that other cases of adult tuberculosis occurring at the sub-apical or other parts of the lung are due to mass infection. We have all heard of perfectly healthy people with a family history free from tuberculous taint acquiring the disease through living with a husband or wife who is a known case of open phthisis. This is naturally a question of resistance on the part of the subject involved.

Radiological interpretation.

On the basis of the above it is to be assumed that phthisis starts first as an infiltration of the lung parenchyma in the form of a small broncho-pneumonic patch. The commonest situation to find this in the radiogram is just below the clavicle to the outer side of the mid-clavicular line. The first sign seen in a radiogram consists of a fine mottling of the lung field in this region. The presence of such mottling coupled with symptoms suggestive of phthisis must be taken as definite, even though no physical signs are present. If a patient is suspected of having phthisis, and no mottling is seen, subsequent examinations should be made over a long period

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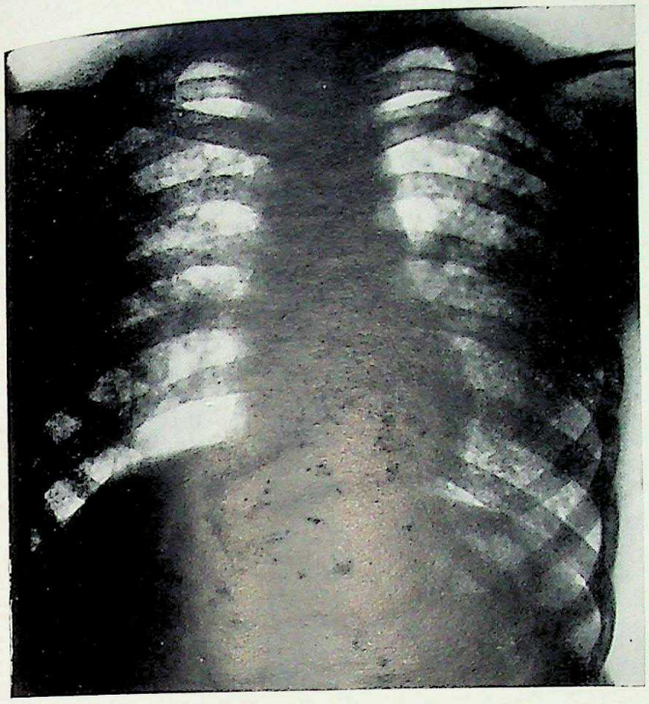

Fig. 5.—Extensive infiltration, almost of the miliary type in both lungs, in a rural dweller. The history was of very short duration.

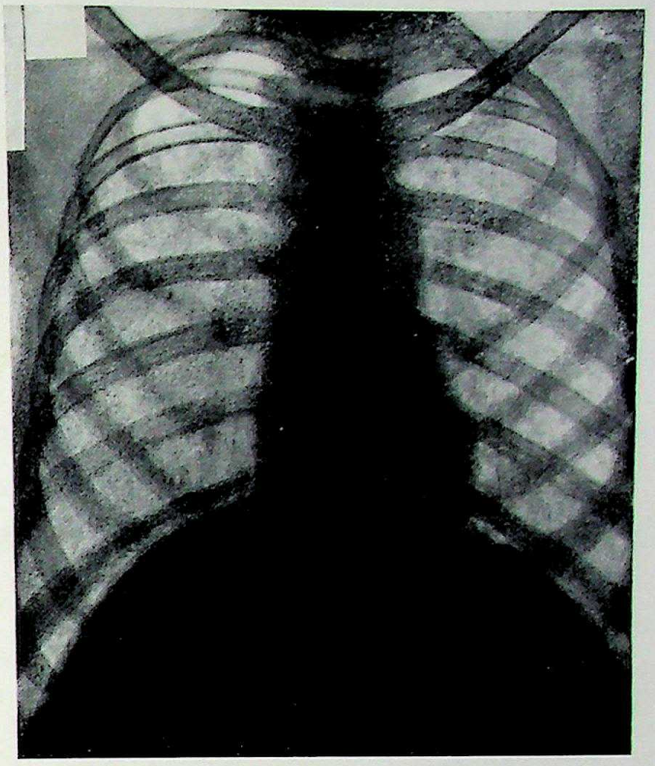

Fig. 6.—A case of true miliary tuberculosis. This patient died the day after the skiagram was taken.

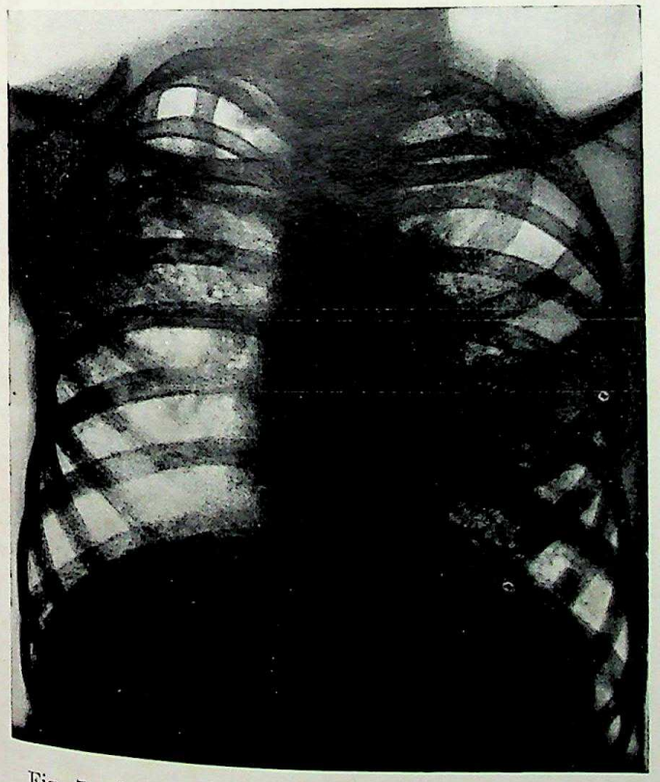

Fig. 7.—An advanced case of bilateral phthisis. One very large and several smaller cavities are seen in the left lung, and some in the right.

Fig. 8.—Extensive fibroid phthisis with cavitation is seen in the left lung. The heart and mediastinal structures are retracted towards this side. Less extensive infiltration with some small cavities is seen in the right upper lung field.

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till such mottling is found, or the symptoms completely clear up. It must be clearly understood that mere thickenings of portions of the bronchial tree are not to be taken as mottling. Dr. Finzi has perpetrated a very trite aphorism on the subject: "So long as the branches of the bronchial tree remain branches the condition is normal, where these branches begin to bear fruit then the condition becomes pathological." The fine mottling described is sometimes accompanied by more sharply-defined linear shadows radiating towards the periphery. This is often a sign of a healing lesion, the linear shadows being due to fibrosis.

A frequent result of the initial lesion in the lung parenchyma is a reaction of the lymph glands at the hila of the lungs. This reaction may in some cases be out of all proportion to the initial lesion. As the lymph flow is from the periphery towards the centre, some skiagrams show together with this reaction in the hilar lymph nodes, a thickening of the lymphatics at the peri-hilar zone. This very much simulates an infiltration from the centre peripherally. Such appearances in the past have been interpreted as being due to "hilum tuberculosis." While it is probable that in certain subjects the breaking down of an initial lesion at or near the hilum may spread either by contiguity or aspiration towards the periphery, it seems probable that the reverse process takes place in the majority of cases.

It must always be borne in mind that heavy root shadows are common in city dwellers, and such shadows must be interpreted with care. The interpretation of the degree of enlargement is a matter of experience. Large shadows may be seen in normal roots. On the other hand they may be due to infection. Such diseases as lymphadenoma, lymphosarcoma and the leukæmias must be borne in mind.

In fibroid phthisis the disease progresses slowly, but very surely, with a good deal of scar tissue and sometimes cavity formation. Owing to the former the affected side may retract and take with it the heart and mediastinal structures, causing a displacement of these from the mid-line. If later on further infiltration takes place in the other lung, it is found to be either at the centre or far out at the periphery. The same phenomenon which is in the nature of a central invasion has also been met with in cases where the primarily affected lung has been treated by artificial pneumothorax.

Cavities are demonstrated as clear spaces often rounded in a consolidated patch of lung. In many cases these cavities may be so large as to resemble a partial pneumothorax. They are differentiated from pneumothorax by the presence of an irregular, often crenated, edge, whereas a pneumothorax has a sharply-defined outline. A cavity may be filled with fluid which will be shown as an opacity. Sometimes it is partly filled, when a fluid level can be seen.

In the more acute forms of infiltration, approximating to the broncho-pneumonic type, several opaque broncho-pneumonic patches will be seen in the lung corresponding to the affected parts. Such cases in the adult have a grave prognosis.

Miliary tuberculosis.

This is shown in the skiagram by a characteristic fine mottling extending throughout both lungs. The condition once seen can never be mistaken. The only conditions which at all resemble it radiographically are the conioses. These latter show mottling of a much harsher type.

Pleurisy.

An initial dry pleurisy cannot be demonstrated in a radiogram. On the fluroscopic screen, however, it may be seen as a reflex inhibition of diaphragmatic movement on the affected side. When this dry pleurisy is followed by an effusion the latter is at first horizontal at the extreme base, the costo-phrenic angle being obliterated. Later on, the dome of the diaphragm disappears and still later, owing to the elasticity of the lung, the shadow takes the form of a curve, the upper end of which is at the periphery. This curve is known as the curve of Damoiseau or Ellis's curve. In course of time as the effusion becomes greater, the heart and mediastinal structures will be displaced to the opposite side and the ribs flattened. In cases where a pneumothorax has taken place with the formation of fluid a very striking appearance is seen. The fluid takes a definite level in the form of a straight line which on the screen is seen to ripple with each heart-beat. Above this, centrally, near the mediastinum, is seen the collapsed lung while at the periphery is seen only air-filled thorax. In cases where there has been pleurisy which has healed, we often see the mark of the disease in the form of either a filling in of the acute angle at the costo- or cardio-phrenic junctions, or sometimes by a characteristic "tenting" or "peaking" of the diaphragm, all due to fibrous adhesions. In some cases a generally thickened pleura is distinguished as an homogeneous opacity with no blurring of the bronchial tree.

The presence of a tubular type of heart is often associated with a tuberculous diathesis, but is not necessarily so.

Tuberculosis in children.

It has been a matter of experience that tuberculosis in the child has certain definite characteristics distinguishing it from the adult type. According to Meyers the disease probably originates as a broncho-pneumonic patch in the lung from which the tracheo-bronchial glands are infected, and enlarged. The original lesion in the lung parenchyma may heal and almost completely disappear, a small

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area of fibrous tissue with calcification—Ghon's body—being left.

The affected lymphatic glands may fibrose or calcify or they may break down or caseate. The site of the original parenchymatous infection in children is more frequently at the base. It sometimes spreads rapidly giving rise to a diffuse broncho-pneumonic type of disease, the clinical course of which is that of a protracted broncho-pneumonia. In certain severe cases, usually ending fatally, an almost entire consolidation of both lungs is seen. It has been the experience of tuberculosis workers in India that in rural dwellers in this country, living in areas remote from towns, though they may be adults, the disease takes the form, and very much resembles the type, usually found in children. This is probably due to a lack of inherited and acquired resistance.

Conclusion.

In conclusion, radiology must not be taken as the all in all in the detection of tuberculous lesions of the chest. It must be borne in mind that radiology is only one link, though an important one, in the chain of diagnosis, and the exclusion of other links naturally tends to weaken the chain. A proper consideration of the history and symptoms is indispensable. An equally thorough physical examination must be done in all cases. Needless to say regular examinations of the sputum are necessary. On the other hand, the value of radiology must not be underestimated. It is not too much to say that every single suspected case should be radiographed. Some years ago a certain young radiologist from the provinces of England, now very well known, came to London and showed a number of beautiful plates proving the utility of *x*-rays in the diagnosis of early phthisis. One of the physicians attending the meeting, a well-known authority on diseases of the lung, congratulated the young man on his efforts, patting him on the back but at the same time saying "Surely none of these cases which you have so admirably demonstrated to us at this meeting could escape detection clinically." The young man replied, "Sir, of the cases I have shown to-night three have recently been passed by you as first-class lives."

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ON THE PRESENCE OF A FILARIAL WORM IN A TUMOUR REMOVED FROM THE LEFT SIDE OF THE NOSE OF A CHILD.*

By A. J. NORONHA, M.D.,

Lecturer in Pathology and Bacteriology, Byramji Jeejeebhoy Medical School, Poona, and Pathologist to the Sassoon Hospitals, Poona.

THE case under discussion was operated on by Dr. G. S. Mandlik of the Sassoon Hospital. The tumour, sent to me for examination and report, came with a diagnosis of 'meningocele ?, neoplasm ?'. The history of the case, as very kindly supplied to me by Dr. Mandlik, to whom my sincere thanks are due in this connection, is as follows:—

"Baby of Sadhu, female, aged six months, admitted into hospital on 27th April, 1931, with fronto-nasal tumours, diagnosed at the out-patient department as 'dermoid cysts ?'. The duration of the disease was 4 months.

On examination, there is a swelling on each side of the nose, the size of a walnut; surface is pink and shiny; both the swellings extend downwards to the nostrils and upwards under the roof of the orbit, but not over the frontal bone. Both eyeballs are displaced outwards in a purely mechanical way and without invasion of the ocular structures. (This surmise was proved to be correct later on, after operation.) The tumours are mobile to a certain extent, but adherent to the skin at their apex. The swelling on the right is the larger of the two, and here and there shows fluctuation. The skin over it shows inflammatory signs and some hæmorrhagic spots. The left tumour is more tense and more regular in contour.

"Starting in early infancy as a pimple on each side of the nose, below the inner canthus of the eye, they have been growing gradually larger and larger during the last four months. Whether these pimples were present at birth is difficult to determine, as the statements in this connection are not, to my mind, very reliable. There is no history of any congenital abnormality in other children of the family.

"Operation on the 29th April, 1931. The tumour on the left side was dissected out. The portion immediately below the skin was

* Being a paper read before the Poona Medical Society on 5th August, 1931.

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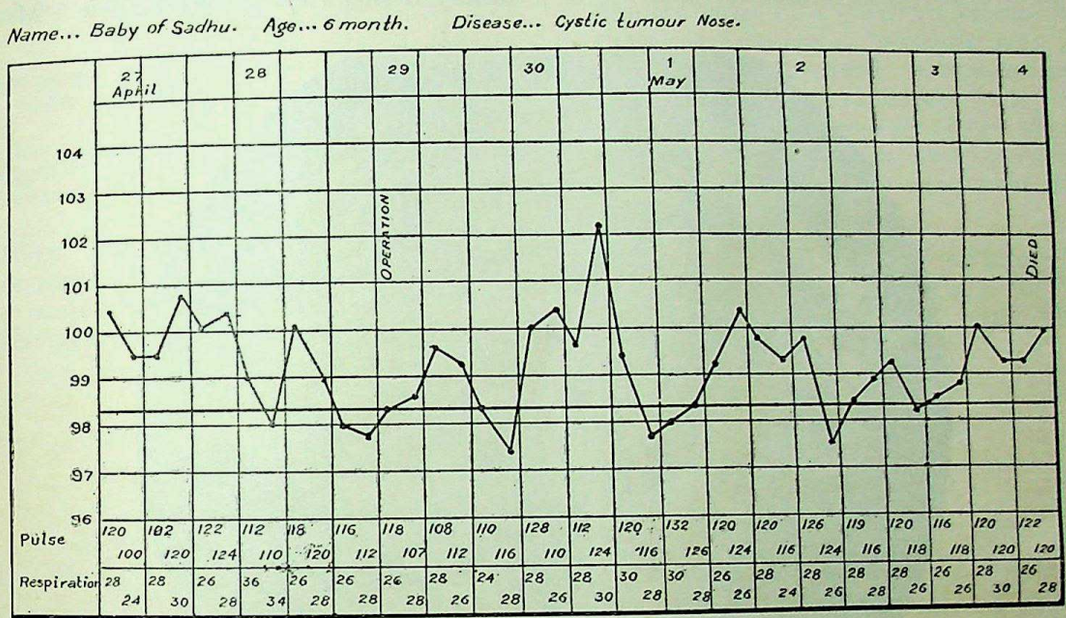
solid and adherent to the latter, while there was a definite cystic feeling in the portion deeper down. This cystic portion was not adherent to the surrounding structures. The tumour extended under the roof and medial wall of the orbit. Towards the nasal side, the septum was found perforated near the roof of the nose. Through this gap in the septum the tumour on the right was found bulging after that on the left had been removed. The tumour on the right could not be dealt with as the child's condition would not permit it. I decided to postpone the second operation for a week on this account. The cyst contained a clear straw-coloured fluid.

"The accompanying chart shows that the patient was febrile from the time of admission. The fever continued until death. After operation the wound was packed with B. I. P. P. gauze which was removed 48 hours after. On removal of the dressing, the wound was found clean and granulating, but the tumour on the right side kept on increasing in size. On 3rd May, 1931, the child became suddenly unconscious in the morning. The tumour on the right side was found smaller and the overlying skin had lost its shiny appearance, exhibiting instead a definitely wrinkled surface. I could not determine whether this was due to the cyst bursting into the wound or into the cranial cavity through the orbit. The patient died at 2-15 A.M. on 4th May, 1931.

The child's parents reside at Godnadi, a taluka in the Poona District. It is not possible to obtain any further history of the case, much as I would like to do it." So much for the clinical history of the case.

The solid portion of the excised tumour was sectioned. It showed transverse and oblique sections of a nematode worm and it is just possible that more than one worm is represented in the tumour, though I must state that in every instance the section is that of a female. The uterus of the worm fills the body-cavity completely and contains numerous embryos, mostly out of their sheaths. These latter lie cut in segments of variable size, scattered in the midst of the mass of embryos. One of the specimens shows the wall of the tumour itself. This wall consists almost entirely of fibrous tissue which has taken the fuchsin colour of the van Gieson's stain. In places the meshes of the collagen fibres are infiltrated with many eosinophiles and fewer plasma cells. The eosinophiles are seen to greater advantage in specimens stained by Giemsa's method.



The sections of the worm itself show a well-marked cuticle in which three definite layers can be discerned. The central layer has taken a purplish colour with hæmatoxylin and biebrich while the outer and the inner layers are stained light pink. On the inner side of the cuticle is the cut layer of the longitudinal muscle. It shows radial striations, possibly caused by the knife. Apparently the cœlomic cavity is oval in shape. This statement is made with certain reservations as it is not possible absolutely to guarantee that the sections on which this statement is based are transverse, *i.e.*, cut exactly at right angles to the long axis.

As above mentioned, the uterus fills the entire transverse diameter of the body-cavity. It is not possible to speak of the longitudinal diameter with equal confidence, though in the numerous sections so far examined by me I have ascertained that the organ does so fill the cœlomic space. The cuticles are not smooth as in the case of *Wuchereria bancrofti*, but are rough and the edges are serrated, or rather finely and irregularly scalloped. It is difficult

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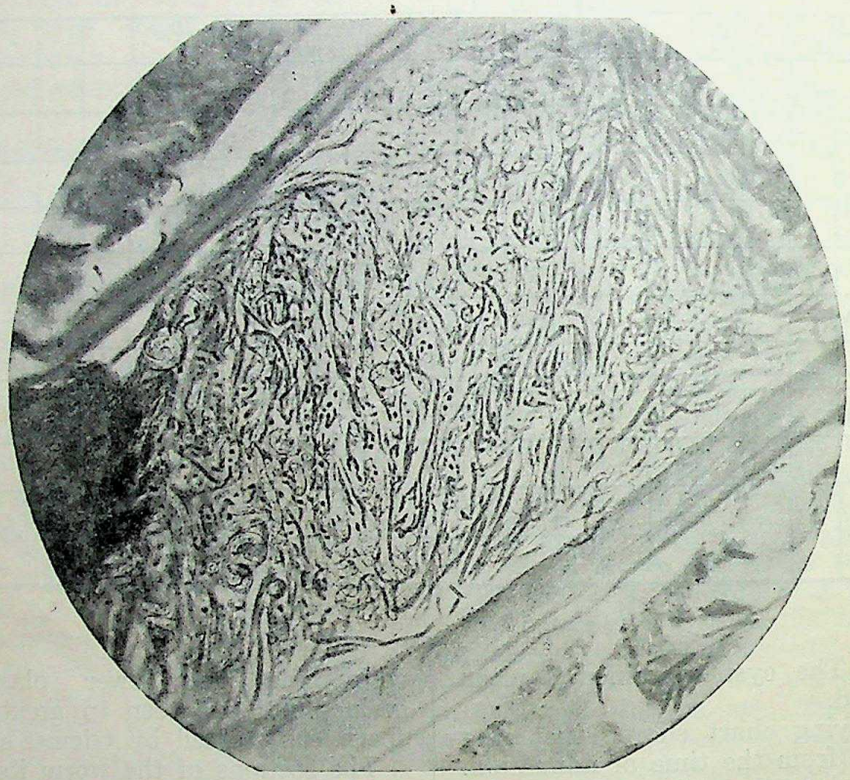
for obvious reasons to decide as to how much of this appearance is due to the chemicals used in the preparation of the sections. Some pieces show regular connecting lines between the serrations on the two sides.

I have been fortunate in securing one or two detached embryos. You will realise that in spite of dehydration to which the sections of the tumour were subjected, the embryos under discussion are club-like and much thicker than those of *Wuchereria bancrofti*. They are also shorter and wanting in the graceful outlines, so pleasing to the eye in the case of the microfilariæ. There is another difference; the embryo we are discussing begins to taper more or less sharply at about four-fifths of its entire body-length into a fine pointed tail. A corresponding fine point of the containing sheath has also been observed. The anterior end is rounded and somewhat narrower than the middle of the body and a study of isolated embryos shows that tapering does not commence until the last one-sixth of the entire length is reached. I have not yet succeeded in studying satisfactorily the minute structure of the worm. Unfortunately, the dehydrating process has given rise to a good deal of vacuolation which makes the study of the excretory apparatus and of other details difficult. Specimens stained by Giemsa's method, however, reveal nuclei extending, as far as I could ascertain, to a little distance from the tail-end, where they become more rod-like as compared to their round shape in the upper segments. I am at present engaged in studying every isolated embryo that I can pick out and I trust I may be able to reconstruct the details of the entire embryo from these attempts.

As regards the actual position in the zoological scale of the worm in question, it is impossible to make at this juncture any categorical statements, considering that we are studying undetermined portions of the parent worm. I shall, however, venture on a purely speculative basis to suggest that the worm occupies an intermediate place between the Filaridæ and the Philometridæ. I am following in this connection the classification adopted by Brumpt. It would thus be necessary to create another family if this view proves tenable. My reasons for taking this stand may be briefly summarised as follows:—



Photomicrograph of the longitudinal section of the worm with embryos.

1. The uterus of the worm in question fills the whole of the body-cavity just as that of the guinea-worm does. I am assuming that the longitudinal diameter is filled likewise. This condition is not absolutely necessary for my purpose but it very probably exists, as in spite of very thorough efforts I have not been able to record observations pointing to the contrary. This statement is of course subject to reservations. The guinea-worm may at once be ruled out of consideration as its very size would preclude its escape from observation both by Dr. Mandlik and myself during our naked-eye examination of the tumour. Moreover the embryos of this worm are devoid of any sheath and have a tail equal to about a third of the body-length. The embryo under discussion, apart from other considerations, has a tail

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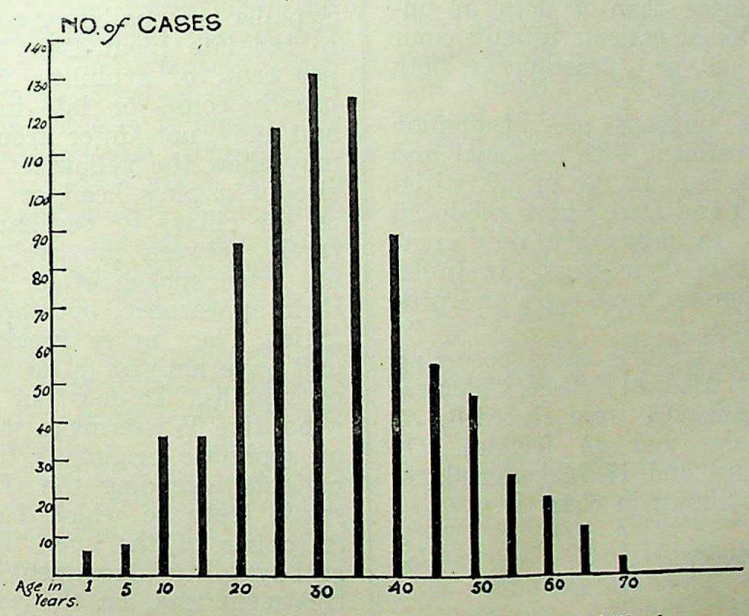
	Total.	Wassermann reaction.	
		+	—
Gumma—			
(a) Caruncle ..	1	2	..
(b) Sclera ..	1		
Ulcers of the lid (primary sore).	2	2	..
Ulcer, corneal ..	5	2	3
Conjunctivitis—			
(a) Phlyctenular ..	8	6	2
(b) Chronic ..	34	25	9
Pseudoplasms in the orbit.	6	6	..
Ptosis	3	3	..
Ophthalmoplegia ..	10	10	..
Herpes zoster ophthalmicus.	2	2	..
Blepharitis	3	3	..
Dacryocystitis ..	2	..	2
Retro-bulbar neuritis ..	7	4	3

Of these 788 cases, only two were in the primary stage. They took the form of an ulcer on the conjunctival surface of the upper eyelid. Primary sores of the eyelids are rare. They are not easily diagnosed as they do not give the typical appearance of the hard chancre as seen on the external genitals. On treatment the sore clears up rapidly without any permanent harm to the eyelid.

Interstitial keratitis is responsible for a large number of cases and the diagnosis is not difficult to make. It is a very serious condition, and accounts for a large amount of unnecessary blindness in Bengal. It is distinguished clinically from other varieties of keratitis by the fact that it involves primarily the deep layers of the cornea and renders them opaque while the inflammation lasts. The infiltration of the cornea begins either at the centre or at the periphery. White spots first appear which increase in number, and gradually enlarge, until the whole cornea becomes opaque. Vision is gradually reduced to hand or finger movements. The surface of the cornea becomes like ground-glass, but no breach in the epithelium takes place. Circum-corneal injection is usually present and while the inflammation of the cornea is taking place vascularisation occurs; the newly formed vessels are derived from the perforating scleral branches of the anterior ciliary arteries. They are arranged in tufts like the twigs of a sweeper's broom, and do not show the arborescent branching seen in pannus, which is a superficial vascularisation derived from the conjunctival blood vessels. Sometimes superficial blood vessels from the marginal network of the cornea grow over the limbus for a short distance, forming what is known as the salmon patch.

One often gets a history of injury to the eye which precipitates an attack of interstitial keratitis. The patient will often tell you that the cause of his eye condition is a bit of grit getting into his eye. This is of great importance in medico-legal cases, and I have constantly seen workmen in factories lose almost total vision in one eye resulting from a trivial injury to the cornea in the discharge of their duties. One should be careful in these cases to examine the blood for syphilis, and it is surprising how often it will be found positive. The trivial injury to the cornea precipitates the onset of an attack of interstitial keratitis, and from the legal aspect for compensation, injury is alone looked upon as the exciting cause.

CHART I.



Number of cases. Incidence of ocular syphilis in different ages, 1930.

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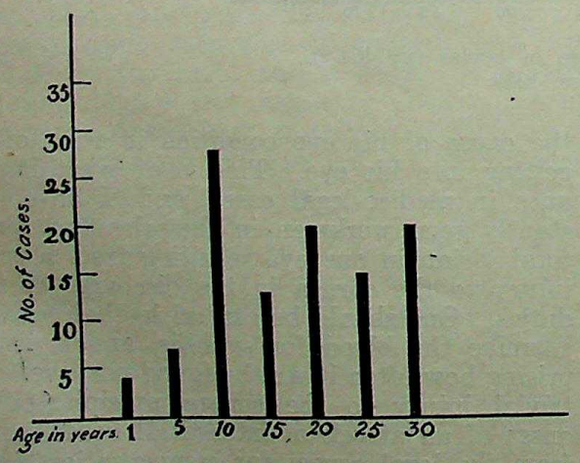
The uvea usually shares in the inflammation; inflammation of the iris and ciliary body is very common, hence interstitial keratitis is sometimes known as anterior uveitis and is always a chronic inflammation. The disease takes some weeks to reach its height and is usually accompanied by photophobia and lachrymation. Pain may or may not be present, and when present is usually not severe. The corneal opacity begins to clear first at the margin, and last in the centre which, however, may remain permanently opaque. Cases vary very much in degree, some showing a few nebulæ, others dense white opacities. Both eyes are likely to be attacked, but the disease may exist for some time in one eye before it develops in the other. Both eyes are involved sooner or later, but if patients are treated early and energetically with preparations of arsenic and bismuth as soon as the diagnosis is made, the inevitable involvement of the other eye will undoubtedly be less. Carvill and Derby report 18 per cent. of their cases in which the second eye never became affected, and it is now the general opinion that when the second eye does become affected during the course of treatment with salvarsan and bismuth the disease clears up more rapidly and with less permanent damage than it does in untreated cases. In India, patients usually come for treatment late, and, as a consequence, both eyes are always involved.

Many ophthalmic surgeons are of opinion that anti-specific treatment with arsenical and bismuth preparations is of no use in interstitial keratitis, but Carvill and Derby have produced actual visual tests to prove the very great advantage of the use of these drugs. In India, it is difficult to follow up these cases and produce reliable statistics.

Of the interstitial keratitis cases occurring in the Eye Infirmary, Medical College, Calcutta, during the year 1930, 107 were recorded, of which 63 were males and 44 females. Of these, 90 were Hindus and 17 Mohammedans. The age incidence is shown in chart II.

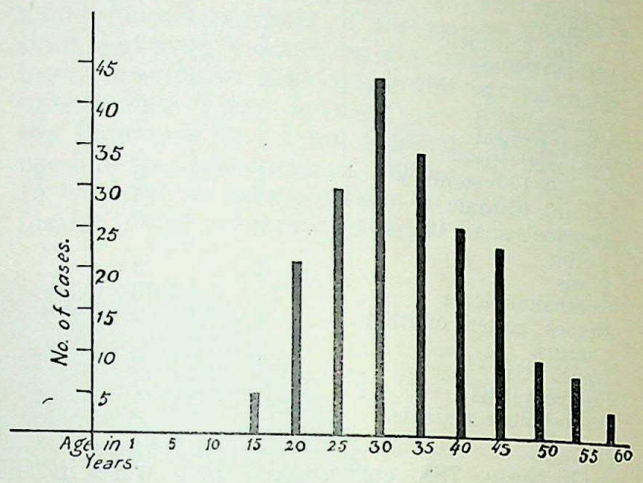
Chart II.



Age incidence in interstitial keratitis of patients attending during 1930.

Iritis and Irido-cyclitis.—Of the iritis cases, 129 were males and 36 were females; Hindus—105, Mohammedans—42, and others—18. The age incidence is shown in chart III.

Chart III.



Iritis and cyclitis age incidence chart, 1930.

Iritis is a common complication of syphilis and, among general causes, easily comes first in Bengal; at least half our cases are due to it. Syphilis is appallingly common and, according to the late Lieut.-Col. Maynard, one to four per cent. of syphilitic patients get iritis. It usually comes on late in the secondary stage, and may not differ from ordinary iritis, or may show the yellowish red nodules about the size of a pin's head or larger, situated either on the ciliary or pupillary margin of the iris, rarely between the two zones. These nodules are often spoken of as gummatous iritis from their appearance, but they are not gummatous iritis. They never break down or suppurate, and have nothing to do with the tertiary stage of syphilis. It does not follow, however, that a positive Wassermann means that the iritis is of syphilitic origin, as the generality of the patients attending the Eye Infirmary have septic teeth to which I attribute most focal infections of the eye. These cases are given anti-syphilitic treatment as well as dental treatment and, on the whole, do well.

Syphilitic iritis is often accompanied by cyclitis. Precipitates can be seen on the back of the cornea and sometimes adhesions of the periphery of the iris occur. Vitreous opacities are often present as well; the tension of the eye may be raised or lowered according to the duration of the disease.

Optic atrophy is responsible for 130 cases of which 98 were males and 32 were females. Of these 98 were Hindus, 25 Mohammedans and 7 other castes. The right eye was involved in 11 cases, the left eye in 12 cases, and both eyes involved in 107 cases. The greater proportion of these cases were of the secondary atrophic type due to optic neuritis. Early treatment in these cases is very important to

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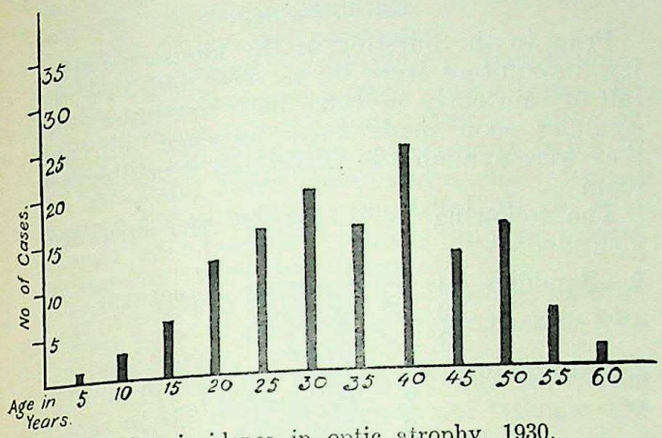
keep the condition stationary; otherwise they go on to complete blindness. The age incidence is shown in chart IV.

CHART IV.



Age incidence in optic atrophy, 1930.

Optic neuritis, choroiditis, and retinitis, occur in the late secondary stage of acquired syphilis and are fairly common.

Cataract.—Twenty-two cases of the juvenile variety were attributed to syphilis, of which 18 showed a positive Wassermann. These cases were treated until the Wassermann reaction was negative and then the cataract was removed in most cases. No operative interference if possible should be carried out on an eye if the Wassermann reaction is positive, as complications, such as iritis and irido-cyclitis, are likely to occur. In some cases, such as secondary glaucoma, an operation must necessarily be carried out, but surgical treatment should be as conservative as possible until the patient is well under the influence of anti-specific treatment.

Ocular hæmorrhages associated with syphilis occurred in 9 cases; 4 were retinal, 4 vitreous and one subhyaloid. In all cases the Wassermann reaction was positive.

Pseudoplasms in the orbit occurred in 6 cases, all of which showed a positive Wassermann. They are due to chronic inflammation and clear up well under anti-specific treatment. They are often diagnosed as intra-orbital neoplasms, but on the operating table are found to be the results of chronic inflammation. It is always a wise precaution to have the blood tested for syphilis in cases of lagophthalmos of obscure origin.

One of the most interesting ocular complications of syphilis in this list is chronic conjunctivitis, which is really tarsitis and often diagnosed by medical men as old trachoma.

Trachoma originating in Bengal is most uncommon and when the blood in the so-called trachoma cases is examined, it is often found to have a positive Wassermann reaction. This tarsitis occurs in the tertiary stage of syphilis and is a gummatous inflammation. The tarsal cartilage is hard and much thickened; the eyelashes fall out. The condition usually affects both upper eyelids, but it is quite common to see only one affected. The lower eyelids may also be involved.

Ocular neural complications were manifested by ptosis, paralytic squint, ophthalmoplegia, externa, interna and complete, and herpes zoster ophthalmicus. It is interesting to note that the Wassermann reaction was positive in all these cases, and the result with anti-specific treatment was eminently satisfactory.

Glaucoma of the nature of the primary type occurred in 9 cases, and in all cases the blood was positive to syphilis. These cases showed no evidence of inflammation.

The routine anti-specific treatment in the Eye Infirmary, Medical College, Calcutta, consists of weekly intramuscular injections of metallic bismuth and sulfarsenol. Bismuth can be given in large doses, but arsenical preparations should be given with care. I usually advise half the ordinary dose in cases in which the eye is not involved. If larger doses of arsenical preparations are given there is a danger of the Herxheimer reaction taking place.

I have at present under treatment two cases of syphilitic optic neuritis in which the vision fell considerably after injections of sulfarsenol. The patients of course attribute the loss of vision to the treatment and not to the disease. The arsenic should be stopped in these cases and as a rule the vision recovers very slowly after a considerable time. The course of treatment should consist of 12 weekly injections of bismuth and arsenic; when this is completed a course of potassium iodide should be given orally, and the Wassermann reaction tested again after three months from the day of the last injection. If the Wassermann reaction is found positive, another course of bismuth and arsenic should be commenced.

Summary.

On the whole, the treatment of syphilitic diseases of the eye is very satisfactory, and patients should always be given general treatment until the Wassermann reaction is negative. The general health of the patient should be carefully attended to, and septic mouth conditions which unfortunately are very often present should have their appropriate dental treatment. In cases of optic atrophy and in cases of interstitial keratitis occurring in adults, the prognosis is bad and blindness or partial blindness often results in such cases. I cannot impress too much on medical men the importance of early and energetic treatment of ocular syphilis and syphilis in general in order to prevent this common cause of blindness in India.

In every case the Wassermann reaction was performed in the department of Lieut.-Col. R. B. Lloyd, I.M.S., the Imperial Serologist. My thanks are due to him for his co-operation in this investigation.

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My thanks are also due to Dr. Suren Sen who has helped me in the collection of the statistics for this article.

AN INVESTIGATION OF THE SHORT FEVERS AT TRIMULGHERRY, 1931.

By Military Assisant Surgeon C. D. TORPY, I.M.D.,
British Military Hospital, Trimulgherry (Deccan).

Every year with marked regularity, Trimulgherry is visited by an acute specific fever of short duration, which hitherto has been in sporadic form, but which, this year, has appeared in epidemic form.

It was thought interesting, therefore, to take advantage of the epidemic to investigate this fever, and this was done on the lines adopted by Major R. N. Phease, R.A.M.C. (1929), in his investigation of the short fevers at Kamptee, Central Provinces, in 1928. It is all the more interesting to note that the findings at Trimulgherry bear a striking resemblance to his, and it would appear that these short fevers at Trimulgherry are identical with those of Kamptee.

Seasonal incidence.

With the exception of a couple of cases of sandfly fever, or dengue which occurred earlier, the epidemic of the short fevers began in the last week of May (a fortnight before the breaking of the monsoon here), and rapidly reached its maximum by the last week of June (when the monsoon is established), and then commenced gradually to wane in the middle of July. The onset corresponds closely to the break of the monsoon, with its attendant lowering of temperature, and increase of humidity, both of which climatic factors are so congenial to the rapid propagation of all species of insect vectors.

Meteorological factors.

During the first week of June, when the break of the monsoon was daily expected, the maximum daily temperature varied from 101°F. to 111°F., whereas the minimum temperature varied from 71°F. to 83°F. With a few showers of rain the maximum daily temperature dropped to 94°F., and the minimum to 73°F. With the fall of further rain, the temperatures varied, the maximum never exceeding 101°F., nor the minimum 79°F.

The minimum temperature varied between 67°F. and 79°F.; this is significant as sandflies breed best, so it is stated, between 70°F., and 86°F. The total average rainfall for Trimulgherry is about 33 inches, the greater part falling in June and July. Trimulgherry is a hilly place, and the intermittent rainfall helps to fill the *nullahs* and ragged places, forming stagnant pools, which become ideal places for breeding mosquitoes.

From chart A it will be seen how closely the epidemic fits in with the onset of the monsoon, and how also the cases increase in numbers from 8–10 days after the rainfall, suggestive, as Major Phease has pointed out, that the period between the laying of the egg, and the development of the adult stage is comparatively short.

Entomology.

Prior to the bursting of the monsoon only a few mosquitoes were to be seen, but with the fall of rain early in June, both mosquitoes and sandflies soon made their presence felt, and they were available in practically every barrack room.

The following is a list of the specimens identified:—

1. Sandflies.—1. *Phlebotomus papatassii.*
   2. *P. minutus.*
   3. *P. clydei.*
2. Mosquitoes.—1. *Culex fatigans.*
   2. *Ædes argenteus.*
   3. *Anopheles culicifacies.*
   4. *Anopheles funestus.*

Phlebotomus papatassii were to be seen in increasingly large numbers in the early part of June, whereas they diminished considerably later, while the stegomyia showed up in larger numbers.

Susceptibility.

1. *Racial.*—The garrison of Secunderabad consists of two British battalions (the larger part of one being away on service in Burma) and three Indian battalions (two of these being away on service in Burma): one battalion British cavalry, two battalions Indian cavalry: three British batteries, a company of Signals, and other small detachments. The difference in the incidence of the disease in the British and Indian regiments is most striking, for whereas in the British corps there were 39 cases in two months, there was not a single case of this particular fever in the Indian corps.

2. *Individual.*—The British garrison consists at present of one infantry and one cavalry battalion, three batteries, and one company of Signals. The infantry regiment are quartered in a single-storeyed building, while the cavalry and artillery live in two-storeyed buildings. The largest number of cases occurred amongst the horsemen, thus lending colour to the theory of the horse acting as a reservoir of the virus. In addition the horsemen affected were found to be those who had the misfortune to be quartered on the ground floor, while their companions, who lived above them, managed to escape the infection. This suggests a useful measure for the prevention of sandfly fever.

Of a total of 39 cases, 22 were from the cavalry the remainder being from amongst the infantry and the Signals.

Symptoms.

The mode of onset of the fever was sudden. In most cases there was a feeling of chilliness, not amounting to an actual rigor, marked

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post-orbital headache, retro-ocular pain, and aching pains in the back and lower limbs. In none of the cases was vomiting present, but a small percentage of cases started off with a mild pharyngitis. The temperature shot up rapidly to 102–103°F., the severity of the headache increased, and the patient looked obviously ill but not prostrated.

The appearance of the patient was characteristic. His face was flushed and bloated, the conjunctivæ injected ('pink eyes'), and he looked ill. Retro-ocular pain, aching pains in the back, and lower limbs, and a chilly feeling were all the symptoms complained of. A total absence of either joint pains, mild or severe, or any rash were conspicuous.

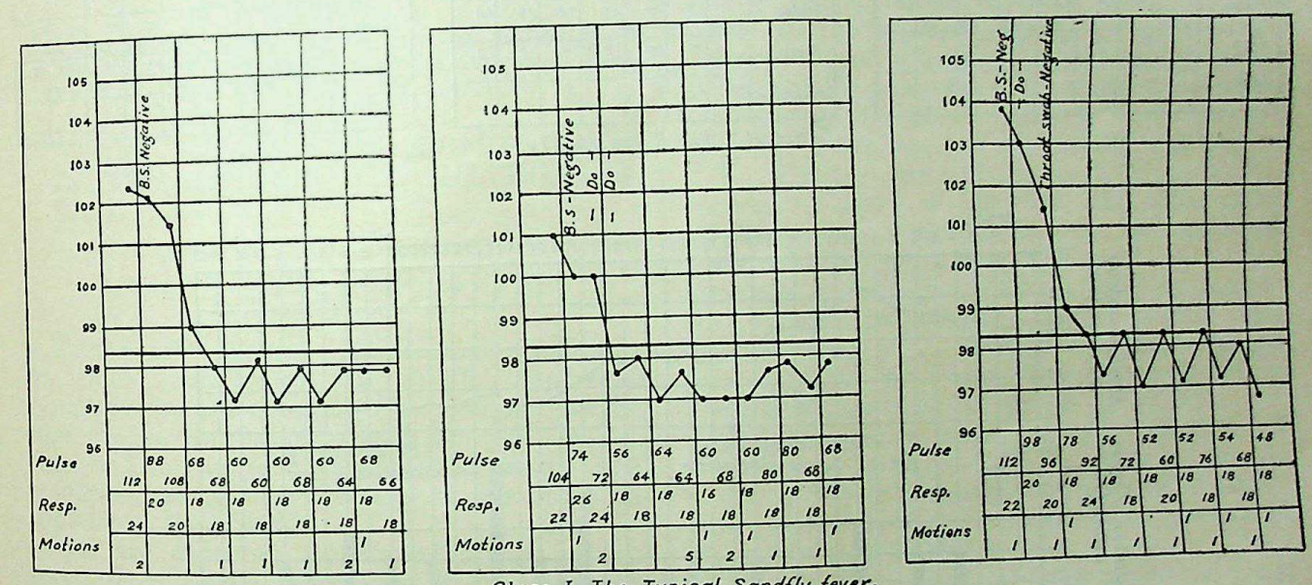
The tongue was dirty, the bowels natural, and the pulse relatively slow in comparison with the temperature.

In a few cases, swelling of the superficial glands of the neck in the anterior triangle was noted. The symptoms reached the height of their severity at the end of 48–72 hours, and then diminished as the temperature fell, usually by lysis at the end of 72 hours. The face lost its flushed and bloated appearance, the 'pink eyes' disappeared, the retro-ocular pain was forgotten, and the patient was decidedly improved. When the temperature reached normal the patient felt well and clamoured for food. In a large number of the cases the convalescence was now uninterrupted, but in many of the other cases it was noticeable that, after an apyrexia of 3 days, the temperature shot up a second time on the 7th day to 101–103°F. with a recurrence of all the old symptoms. On the 8th day, the temperature fell again to normal, where it remained. We now found what Major Phease found at Kamptee in 1928, during his investigation of the short fevers there, that we were dealing with two distinct classes of pyrexia, one with a single pyrexial period of 48–72 hours' duration, the other with an initial pyrexia of 48–72 hours' duration, followed by 3–4 days' apyrexia, and then a secondary rise, which lasted for 24 hours.

Of a total of 39 cases, 25 belonged to class I, and 14 to class II.

Blood picture.

A fair degree of leucopenia was present in all cases (in some as low a total white blood count as 3,200 per c.mm. was obtained). There was a relative decrease of lymphocytes, and a relative increase of large mononuclears. Eosinophiles were increased in the later stages of the fever. Blood cultures, taken in sodium taurocholate solution from the patients when the temperature was at its highest, proved 'sterile' after 48 hours' incubation. Repeated blood smears examined throughout the pyrexial period were negative to both malarial parasites and leptospiræ.



Class I The Typical Sandfly fever.

Discussion.

For purposes of diagnosis, all these cases were returned as sandfly fever. The reasons for this line of action are fairly obvious, as, firstly, during this time sandflies were in abundance, secondly, they (most of the cases) conformed to the usual textbook description, and lastly the joint pains, mild or severe, the rash, primary or secondary, and the marked after-weakness so characteristic of dengue were conspicuous by their absence. Class I cases (charts above) of a single pyrexial period of 48–72 hours were typical of sandfly fever, but the difficulty in diagnosis arose with class II—the relapsing type—and no better explanation for this class of fever with its peculiar secondary rise can be offered than that given by Major Phease, *i.e.*, "From these graphs it is at once apparent that, whereas the cases, which exhibited the simple type of fever rose rapidly to a maximum, and then gradually

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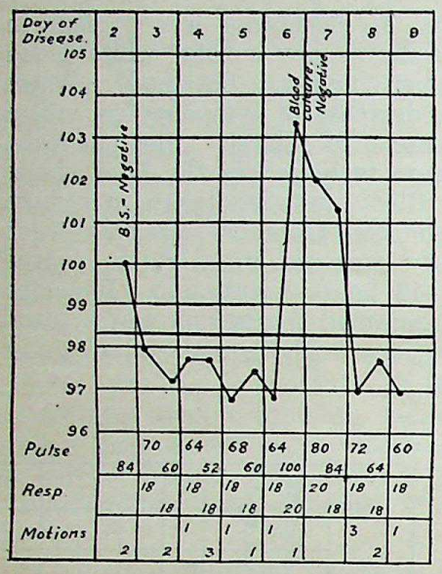
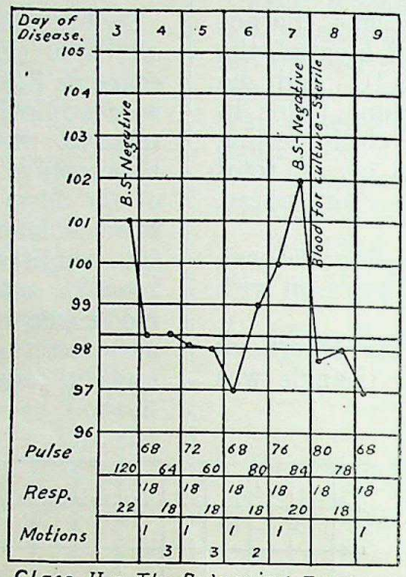
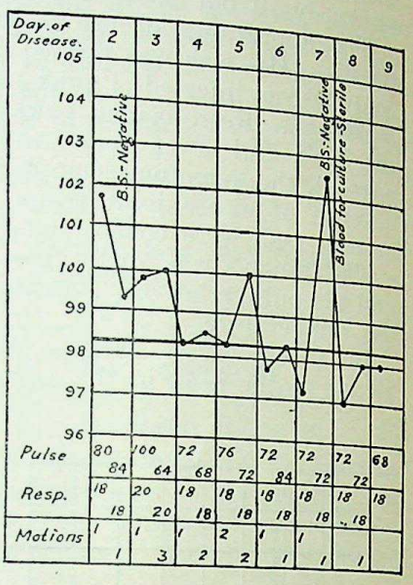
declined, irrespective of the climatic conditions, the graph of these cases of the relapsing type rose and fell in a manner exactly similar to the rise and fall of the graph of the weekly rainfall, but a week in arrears. This is significant, and suggest that the simple type of fever is carried by the sandfly, which requires for hatching, and development the minimum amount of water, whereas the relapsing type is propagated by a mosquito (probably of the genus Stegomyia), which varies in numbers as new breeding grounds are filled after rain, and which has a comparatively short life-history.

That sandfly fever and dengue may exist together is not impossible, provided the individual insect vectors are present, and the conditions are propitious for the breeding of such vectors. With regard to the simple type of fever, this closely agrees with the usual book description of phlebotomus fever, which in all probability it is. The identification of the relapsing type of fever, however, is not so definite, and the stumbling block is the complete absence of a secondary rash."







Class II - The Relapsing Type.

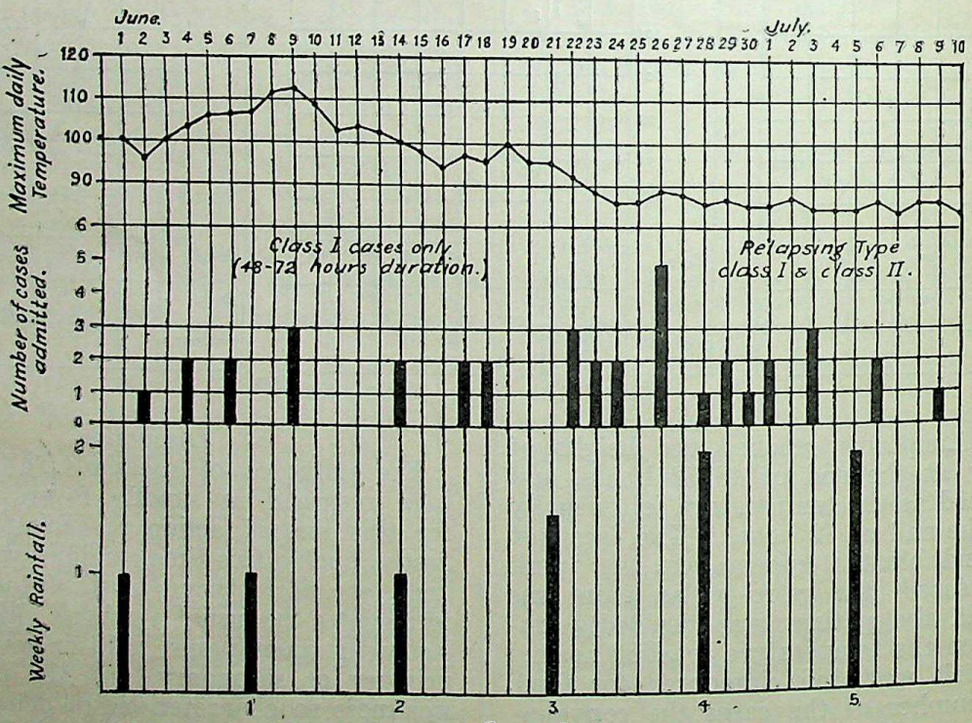


CHART A.

Conclusions.

Sandfly fever occurs in Trimulgherry during the months of June and July. The total absence of joint pains, mild or severe, and of a rash, primary or secondary, does not allow

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of a diagnosis of dengue. The marked post-orbital headache, the retro-ocular pain, and the 'pink-eye' point to sandfly fever. The observation that the troops who lived upstairs escaped the infection suggests a useful measure in the prophylaxis against sandfly fever. The occurrence of the relapsing type (class II) fever, along with the late increase in numbers of the stegomyia after an increase in rainfall, appears to bear out Major Phease that "the relapsing type is propagated by a mosquito (probably of the genus Stegomyia)."

Acknowledgments.

My thanks are due to the Officer Commanding, British Military Hospital, Trimulgherry, and to Major U. Rea, R.A.M.C., Officer in-charge Medical Wards, for their kind permission to publish these notes, and the facilities given me. I am also indebted to Sister I. Cutfield, Q.A.I.M.N.S., for kindly copying the temperature charts for me.

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ICTERUS INDEX: ITS SIGNIFICANCE IN THE SURGERY OF THE BILIARY TRACT.

By A. C. GHOSE, M.B., B.S.,
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THERE are various pathological conditions in which jaundice is one of the important symptoms, manifesting itself by icteroid coloration of the conjunctivæ, back of the tongue, skin, and the nails, in varying intensities. The colour is due to the increase of the bilirubin content of the blood.

We are indebted to Bernheim for having given us a comparative idea of the bilirubin content of the blood by estimating what is called the icterus index of the blood serum in normal and abnormal conditions. Bilirubin is a normal constituent of the blood—the yellowish colour of the serum is due to the presence of this constituent. Any increase of this substance in abnormal conditions produces deeper coloration of the serum, which can be compared to any arbitrary standard solution of the same tint, by means of a colorimeter; the ratio of the standard solution to the serum in its intensity of colour is the icterus index.

The icteroid condition plays the most important rôle in the surgery of the biliary tract, and holds a high significance in the diagnosis, prognosis and treatment of the diseases of the biliary apparatus.

1. Icterus in the newly-born infant calls for the attention of a surgeon in deciding whether the icterus is due to congenital absence or congenital atresia of the cystic and common bile ducts, differentiating it from the grave familial jaundice of the neonate and calling for immediate operative treatment.

2. Another condition is the hæmolytic jaundice in adults which may have to be differentiated from biliary obstruction, and a surgeon may be required to use his skill and scalpel in removing the spleen or ligaturing the splenic artery.

3. The third group of cases of icterus which may be encountered in a surgeon's clinic are infective jaundice following the infection of a wound by *Spirochæta ictero-hæmorrhagiæ;* in this case surgical interference will be fruitless.

4. Catarrhal jaundice does not attract much the attention of a surgeon except when it is chronic in nature and likely to give rise to the formation of gall-stones, which may follow stasis of bile or ascending cholecystitis after catarrhal cholangitis.

5. The most important icteroid condition is due to the obstruction of bile owing to the presence of gall-stones in the biliary passages giving rise to infective cholangitis. In these cases the conjunctivæ are of a dirty-yellow colour. There is usually a history of biliary colic, and the pain may be persistent in nature. There is no distention of the gall-bladder and, therefore, this organ is not usually palpable.

6. The last, but not the least, is the icterus caused by stasis of bile from the obliteration of the biliary passages due to, (*a*) acquired anatomical abnormalities, torsion of the biliary passages or adhesions from local peritonitis, (*b*) chronic pancreatitis, cancers of the head of pancreas, liver, common bile duct and of the ampulla of Vater, (*c*) enlarged lymph glands, tuberculous or due to glandular fever, (*d*) acute inflammation of the ampulla of Vater and prolapse of the mucosa of the common bile duct through the ampulla of Vater, (*e*) foreign bodies and lumbricoid worms in the common bile ducts.

For the diagnosis and post-operative prognosis in affections of the biliary passages, it is absolutely necessary to know the extent of hepatic damage. Though the manifold functions of the liver render the task difficult the van den Bergh reaction, based on the work of McNee, van den Bergh and Aschoff on the origin of the bile-pigments, and Bernheim's icterus-index determination are both of value in the surgery of the biliary tract. The icteroid condition necessitates a thorough investigation of the liver function before any surgical procedure is undertaken. I, therefore, decided to investigate the comparative value of the icterus index and the van den Bergh reaction in cases of chronic abdominal disorders after having estimated the normal icterus index in Indians.

Technique.

The serum was centrifugalised from 5 to 10 cubic centimetres of blood and diluted by the addition of normal saline to 10 cubic centimetres. Ten cubic centimetres of the standard solution of potassium dichromate

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(1 in 10,000) treated with 0.5 cubic centimetre of concentrated sulphuric acid was taken in a Duboseq colorimeter; the vernier was set at between 15 and 20, and the reading of the height of the serum was taken when the colour of the serum matched with that of the standard solution. The proportion of the intensity of the colour of the standard solution to the serum was calculated by comparing the height of the standard to that of the serum. It was then multiplied by the number of dilutions of the serum and the icterus index was thus determined.

TABLE I.

Age.	Number of cases.	Males.	Females.	Vegetarians.	On mixed diet.	Icterus index.
Between 1 to 10	3	3	..	..	3	2.5 to 5
„ 11 to 20	7	5	2	3	4	3.5 to 5
„ 21 to 30	16	12	4	6	10	4.0 to 6
„ 31 to 40	8	6	2	4	4	4.0 to 6
„ 41 to 50	5	2	3	3	2	3.5 to 7
„ 51 to 60	7	5	2	4	3	4.0 to 6.5
„ 60 above	4	3	1	2	2	3.0 to 6

The normal value of the icterus index was found in 50 normal Indians to be between 3 and 6. The lowest value was 2.5 and the highest 7. Age, sex and diet seem to play no rôle in the bilirubin content of the blood. After having estimated the normal icterus index, I proceeded to examine the icterus index in various chronic abdominal disorders.

TABLE II.

Number of cases.	Diseases.	Jaundice.	Icterus index.	Van den Bergh Reaction. Direct. Immediate.	Direct. Delayed.	Indirect.
4	Hepatitis	..	7 to 8	..	..	..
6	T. B. abdomen	..	7 to 8	..	..	..
2	Gastric ulcer	..	6 to 7	..	..	..
2	Duodenal ulcer	..	6 to 7	..	..	..
5	Chronic appendicitis	..	8 to 10	..	..	..
5	Endemic ascites	1	6 to 12	..	..	..
3	Intestinal obstruction	..	7 to 8	..	..	..
6	Cholecystitis	3	8 to 24	..	Positive in 5	Positive in 5.
7	Cholelithiasis	5	10 to 40	Positive in 4	Positive in 1	Positive in 4.
3	Catarrhal jaundice	3	10 to 25	..	..	Positive in 2.
1	Gumma of liver	1	65	Positive	..	Positive.
3	Cancer of liver	2	9 to 40	Positive in 1	Positive in 1	Positive in 2.
2	Cancer of pancreas	2	80 to 120	Positive in 1	Positive in 1	Positive in 2.
6	Cirrhosis of liver	4	6 to 20	..	..	Positive in 3.

There were 20 cases with distinct icteroid coloration of the conjunctivæ; one case of endemic ascites, four cases of cirrhosis of liver, and three cases of catarrhal jaundice needed no surgical interference. Two cases of cancer of the liver, two cases of cancer of the pancreas and one of gumma of the liver died in hospital due to cholæmia before any surgical treatment could be given. In the cases of malignant diseases of the pancreas the icteroid colour changed into a dirty brown and then to a deep yellowish-red, and one of the patients died within a week while the other lingered for three weeks, dying eventually. In this group there were 13 cases of gall-bladder infections; 7 of these were operated upon, in 5 stones were found and in 2 they were not found. All the patients recovered without any post-operative complications.

From table II we can see that the icterus index was raised in practically every case in the above-mentioned diseases, but the icterus index was found to be very high in catarrhal jaundice, cholecystitis, cholelithiasis, and in cancers of the liver or head of the pancreas.

Van den Bergh's reaction was completely negative in most of the diseases even though the icterus index was raised. Van den Bergh's reaction was 'direct, immediate'—in six, 'direct, delayed'—in eight, and 'indirect, positive'—in 19 cases. It was only in the diseases of the visceral organs connected with the liver by lymphatic routes, that a 'direct' van den Bergh reaction occurred. This proves that the van den Bergh reaction is of a greater importance in surgery than the icterus index, because it helps in diagnosing if there be any obstruction in the flow of bile, if there be primary or secondary cholecystitis accompanied by some toxic foci in the liver, and lastly, if there be any hæmolytic condition of the blood.

Mann has shown from the experimental study on animals that bilirubin may be of

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extra-hepatic origin and this probably explains the increase of the icterus index in various other diseases in which the liver function is not affected. Judd (1925), Muller and others (1925) have advocated the necessity of the van den Bergh reaction before any surgical interference on jaundiced patients. Milroy (1929) has worked on the icterus index, but did not find any special utility of this test in the diagnosis of gall-bladder infections.

In a case of jaundice the preparation of the patient is the most important procedure prior to any surgical interference. The surgeons of the King George's Hospital, by being very particular on this point, have been able to reduce the mortality of the gall-bladder surgery to zero. During the last few months, one cholecystostomy, one cholecystemtomy with choledochostomy and five cholecystectomies were performed, and all the patients recovered without any post-operative complications.

It is an undoubted fact that the operative treatment in the diseases of the biliary passages in the presence of jaundice is a matter for the discretion and judgment of the surgeon, depending upon the general condition of the patient, and on the blood-coagulation time, blood-calcium content and the sedimentation rate of the blood. Intravenous or rectal administrations of saline and glucose, blood transfusion, calcium lactate by the mouth, and calcium chloride by the venous route for three days, as advocated by Vincient, Walters and others, should be given to prepare the patient for operation. In cases with persistent jaundice, delay may sometimes prove fatal while an early operative interference relieves the agony of the persistent pain, and saves the life of the patient.

Conclusions.

1. The normal icterus index of the serum in Indians of the United Provinces is between 3 and 6.

2. The icterus index is increased in affections of the biliary passages, in the malignant diseases of the liver and pancreas, and in chronic inflammatory and toxic conditions. It has, therefore, no diagnostic importance in the affections of liver, pancreas, and biliary passages.

3. A high icterus index, about 50 or above, is indicative of a fatal prognosis.

4. The van den Bergh reaction is more useful than the icterus index; it is an invaluable test for the preparation of a patient, and for diagnosis and post-operative prognosis in the surgery of the liver.

In conclusion, I express my gratitude to the surgeons and physicians of the King George's Hospital for the facilities given to me to carry on my work. I am indebted to Professor R. N. Bhatia for the inspiration received from him in my work, and to Captain J. G. Mukerjee for helping me in the clinical work. I am also thankful to the committee of the University for giving me the Research Fellowship.

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A Mirror of Hospital Practice.

A CASE OF EMBRYONAL CARCINOMA OF THE TESTIS.

By MOHD. AJMAL HUSAIN,

Assistant Surgeon-in-Charge, K. E. M. Hospital, Karnal.

J. R., Hindu male, aged 30 to 35 years, resident of Karnal District, was admitted to the K. E. M. Hospital, Karnal, on 5th April, 1931, with a large tumour of the left testis. The tumour was about the size of a big orange, hard, ovoid, and the skin over it was adherent; there was no fluctuation. On the front and upper part of the growth there was a circular area about ¾ inch in diameter over which the skin had ulcerated and a fungating mass was protruding from the opening in the skin and discharging foul pus. The duration of the growth was about ten months; ulceration of the overlying skin had been present for about a fortnight. No glands were palpable in the groin; the cord on the affected side was thickened.

Operation under chloroform.—A big incision was made laying open the inguinal canal on the left side, extending downwards on the scrotum in front, and encircling the ulcerated area of the skin. The underlying mass was separated from the skin, and removed, and the cord was ligatured close to the internal abdominal ring. The stump of the cord was anchored high up after removing the growth. The inguinal canal and the rest of the incision were closed up and a small drainage tube was inserted at the site of the ulcerated skin. Slight blood-stained discharge continued for a few days but it gradually disappeared and the wound healed up by first intention. The growth was sent for examination and report to the Pathologist, Punjab Government. The result was as follows:—

"Histological appearances are those of embryonal carcinoma. The stroma consists of strands of lymphoid tissue in some places, and of fibrous bands in others, where alveolar arrangement is seen. Areas of necrosis are also present."

Points of interest are the nature of the growth and the rarity of the condition.

I am grateful to Captain H. J. J. Fordham, Civil Surgeon, Karnal, for permission to send these notes to the *Indian Medical Gazette*.

CASE OF RECOVERY FROM COBRA BITE.

By K. G. GHARPUREY,

LIEUTENANT-COLONEL, I.M.S.,

Civil Surgeon, Ahmednagar.

A live cobra was brought to me and the person who caught it stated that its teeth had been removed. He showed me one side of the mouth from which the fang and the loose mucous sheath covering it had been removed. The cobra was rather lethargic and looked as

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if it was preparing to shed its skin in a few days. It was intended to chloroform it and transfer it to spirit. However, while it was alive, one rash member of the hospital staff was playing with it and annoyed it. The cobra bit him at the root of the left thumb. There was only one puncture, which began bleeding. He squeezed the blood out at once and washed the thumb under the tap. This happened at 9-35 a.m. on the 11th July, 1931. I came to the hospital at 9-40 a.m. when the patient showed me his thumb which was still bleeding and covered with bright-red fluid blood. He was holding the root of his thumb tightly. A ligature was applied at the root of the thumb and a second one above.

At 9-45 a.m., 40 c.cm. antivenene were injected subcutaneously in four punctures in the abdominal wall and some antivenene was applied to the wound. The patient was made to sit in my office the whole time under my observation.

9-50 *a.m.*—There was no pain but the patient felt some tingling and numbness over his whole body. The cobra-bite puncture was now incised deeply and potassium permanganate was rubbed in. As it is commonly supposed that the taste for chillies is lost in true snake poisoning, he was given some powdered chillies to eat. He said that he did not taste them. He was also given some raw onion to eat which he stated was also tasteless.

9-55 *a.m.*—The wound was still bleeding profusely. The ligatures were removed, and after few minutes a ligature was applied higher up on the arm; this was also removed after 20 minutes.

10-30 *a.m.*—The patient appeared normal except for paræsthetic sensations in the body and a nervous look on his face. Curiously enough he complained of heaviness in the opposite (right) axilla, as though a lump was forming there. He could walk all right and all his movements were intact, though the thumb was still bleeding. His pulse was normal and his respirations were not embarrassed. On being given some more chilli powder to eat he said he tasted it a little.

11-15 *a.m.*—The snake, killed some time before by chloroform, was examined. It was a 38-inches-long female cobra with the right fang and palate teeth removed. The left-side palate teeth and the teeth on the pterygoid bones on both sides were present. There was a small fang on the upper jaw on the left side covered in a mucous sheath. It appeared rather a small fang for a cobra of that size. Probably it was one of the reserve fangs which had begun to function. The snake is preserved in the civil hospital here.

11-30 *a.m.*—The patient had been instructed by me in the identification of poisonous snakes and used to assist me in my demonstrations on snakes. Seeing that the fang was present and knowing that he was undoubtedly poisoned seemed to have made an impression on him and he looked very nervous and somewhat cyanosed in spite of my assurances. On being given chilli powder to eat he said he did not taste it.

11-40 *a.m.*—Speech was normal and all movements were fully performed, but he said his lids felt heavy as if he wanted to shut his eyes. The wound was still bleeding profusely.

11-45 *a.m.*—He walked up to the operation room, about 40 yards distant, and he was given, on the operation table, a slow intravenous injection of 40 c.cm. antivenene. In a couple of minutes after the injection the bleeding from the wound as well as the bleeding from the venous puncture stopped completely, but immediately he complained of severe itching all over the body and his conjunctivæ were very much injected. Considering these effects as anaphylactic, I gave him an adrenalin injection, which relieved him. The conjunctival injection passed off in an hour, though he complained of itching sensation for a few days afterwards.

1-15 *p.m.*—He felt quite well. He said he tasted chilli powder and onions. He was given some green leaves of the *neem* tree (*Azadirachta indica*) but he did not taste them bitter.

1-45 *p.m.*—When I left the hospital, he was practically normal. The bleeding had stopped immediately after the intravenous antivenene injection and he was prepared to go home.

5 *p.m.*—Normal. Felt sleepy.

12*th July*, 1931. 7 *a.m.*—Had a good sleep and felt well except for slight pain at the cuts in the thumb and at the needle punctures in the abdominal wall.

Considering that the cobra was rather lethargic and made only one puncture, it is possible that the dose of poison injected was sublethal. A cobra can inject ordinarily many lethal doses at a bite. This snake was nearly full grown and was irritated when it bit, hence it is not unlikely that even with one fang it had injected a lethal dose and the symptoms, if untreated, would have been late in appearing. That the local bleeding was continuous and profuse shows that the poison was not washed off completely nor was it prevented from being absorbed as it definitely affected the clotting power of the blood. That the prompt administration of antivenene prevented the appearance of symptoms is undoubted. It also seemed that the antivenene given subcutaneously was so slow in absorption that it did not affect the bleeding for about 2 hours, whilst the antivenene given intravenously neutralised the poison that was preventing clotting almost at once.

A CASE OF OSTEOGENESIS IMPERFECTA (FRAGILITAS OSSIUM).

By C. D. TORPY,

MILITARY ASSISTANT SURGEON, I.M.D.,

British Military Hospital, Trimulgherry, Deccan.

A GIRL, N. G., aged 8 years, reported for a radiological examination of her right forearm and wrist. The history given was that the child had slipped and fallen on her hand, an accident which the parents witnessed and which, in their opinion, was quite a trivial injury and out of proportion to the deformity of the hand caused by it.

On *x*-ray examination it was found that she had sustained a fracture of the lower third of the radius with some backward displacement. Reduction of the fracture was easy, and with massage and movements the result was good.

At the time of the *x*-ray examination, it was noticed that the child had markedly blue sclerotics, and the mother of the child volunteered the information that the child had never eaten meat or vegetables, and though nearly 9 years of age had "stuck" to her milk diet—and further that she was very apt to break her bones following on the simplest injury. A diagnosis of fragilitas ossium was made, and the patient warned to avoid falls.

Since then she has refractured the same arm, and fractured the left forearm twice—making in all no less than five fractures in eight months.

The points of interest are:—

1. The rarity of the condition.
2. No hereditary tendency could be ascertained in this case.
3. The child is well developed and quite big for her age.
4. In spite of these repeated fractures there has been no deformity either from mal-union of fractures or from natural bending and

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distortion of bones, a condition usually met with in such cases.

5. The condition seems to have been accentuated by unsuitable diet.

6. With a vitaminous diet, and the administration of Kalzana, the union of the fractures appears to have been accelerated.

A CASE OF VESICAL CALCULI.*

By B. K. DUTT, M.B.,
Colonelgola, Midnapore.

K., Mahommedan male, aged 30 years, district Faridpur, was admitted to the Medical College Hospital on 16th November, 1930.

History of present illness.—(1) Pain in the lower abdomen shooting down to the tip of the penis. (2) No natural flow of urine, only dribbling *per urethram*. (3) Burning pain in the urethra. (4) Discharge of pus and blood occasionally, coming in drops sometimes with urine but especially when the patient strains or on squeezing the anterior urethra. Duration of these symptoms, 7 days.

Past history.—At the age of 10 years the patient used to have "chalky urine" (lime-water colour) occasionally but with local medical treatment the attacks cleared up. These attacks occurred at irregular intervals for two or three years.

For about 10 years he had no further symptoms but he noticed occasional stoppage of the flow of urine while micturating and also the passage of "gravel" along with it. There was a burning sensation shooting down to the tip of the penis together with discharge of blood during this time. These symptoms occurred every 2 or 3 months and lasted off and on for 4 years. He underwent local medicinal treatment and for 3 years he had no further trouble.

The patient gave a history of gonorrhœa 16 years ago. For the last 3 months he has felt heaviness in the lower abdomen with occasional pain and difficulty in micturition, and frequent, scanty urine; this gradually merged into the condition described above and, being in despair at his condition, he came to hospital.

Physical examination.—*Temperature* 99°F., *pulse* 104, *respirations* 32.

Tongue.—Moist, coated with fur.

Abdomen.—No bulging or rigidity, and no tenderness except at the lower abdomen over the pubis where it is tender on pressure—externally nothing of note. Pressure over the pubis causes great pain and discharge of pus in drops tinged with blood, *per urethram.*

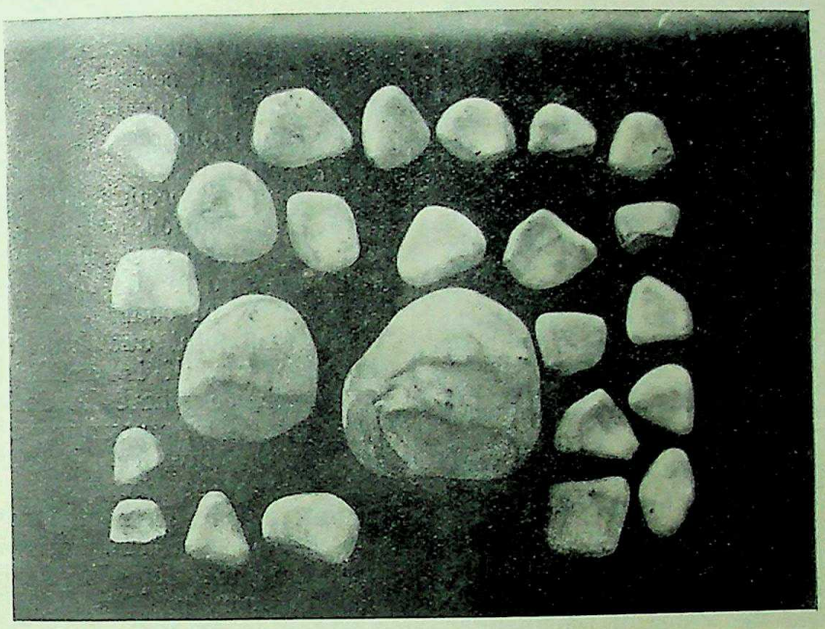
Per rectum.—Many impacted stones can be felt. This examination gives rise to discharge of blood and pus *per urethram*, and causes great pain to the patient.

A sound cannot be fully passed—the tip touches a stone.

Nothing abnormal was detected in the heart, lungs or any other systems.

Operation.—Under general (chloroform) anæsthesia, duration, ½ hour.

The bladder was reached through the suprapubic route by an incision two inches in length in the middle line just over the symphysis pubis. The peritoneum was reflected above till the superior surface of the bladder was well exposed. (Extraperitoneal method.)



The bladder could not be discerned at first. It was collapsed, small and shrunken, with enormously engorged thick veins over the superior surface. It was rather hard and thick and could not be caught up with the artery or Kocher's forceps. It was opened by incising from the top and then the edges were held up with forceps. Inside were found many stones; they were impacted, immovable, and occupied the whole of the bladder cavity leaving absolutely no room. The stones were all jumbled up in such a way that it was difficult to move them. With great difficulty they were all removed one by one with a lithotomy scoop and forceps. When all the stones, twenty-five in number, had been removed some pus was found at the base of the bladder and it was mopped out. The cavity was closed as usual; two drainage tubes were left in; one was kept in the bladder fixed with catgut sutures; the bladder opening was closed with continuous catgut sutures keeping the tube in position. The other tube was left in the space of Retzius and the abdominal wound was closed as usual.

Note on operation findings.—The bladder wall was found to be a third of an inch thick, hard and fibrosed. The inner side of the wall was rather softer to the touch and showed inflammatory changes. It seemed that the bladder wall had contracted over the stones.

The stones were of varying shapes and sizes, the biggest being about an inch and a half in diameter. All the stones are hard, smooth, facetted, oval or rounded. They are all uric-acid calculi with a coating

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*This paper has been extensively modified by the Editor, *I. M. G.*

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of phosphates and carbonates hence they look absolutely white but the cut section shows the presence of the uric acid element by the delicate yellow or yellowish-brown laminæ of very compact appearance laid down with great regularity.

Post-operative notes.—The patient made an uneventful recovery although convalescence was slow. The tube from the bladder was connected to a bottle by tubing and the urine allowed to drain into the bottle. The urine at first was of a deep reddish colour; pus was present but gradually it cleared off. The tube in the space of Retzius was taken out on the second day but that from the bladder came out of itself on the ninth day after operation. A bladder wash of weak Dakin's solution was given daily and one drachm of potassium citras, three times a day, and ten grains of hexamine, twice daily, were given orally. The patient at first had a temperature of 103° to 104°, but gradually it came down. When the tube from the bladder came out a rubber catheter was introduced by the urethra and the same glass-tube connection with a bottle was made. But there was very much less drainage *per vias naturales* and more leaking through the suprapubic wound which had to be dressed every 4 or 6 hours. Sometimes the catheter was taken out and the patient was asked to pass urine naturally. The flow was established very slowly.

The patient had two attacks of fever during his stay in hospital and at first quinine was tried but had no effect. Further, the urine on culture showed *B. coli.* Hexamine 40 per cent. solution, 5 c.cm. intravenously was given and the temperature came down; the injection was repeated on alternate days till the temperature was normal for 3 days when it was stopped and the patient had no further trouble. The urea content of the urine was 2.7 per cent.; blood urea, 0.027 per cent. Gradually the suprapubic opening closed up and the flow was established *per vias naturales;* the patient was discharged cured on 21st January, 1931.

The important points in this case are (1) that the patient carried on with his usual pursuits without much trouble for a long time; (2) the pathological condition of the bladder due to the long-continued irritation of large numbers of calculi occupying the whole of the bladder cavity.

I beg to express my thanks to my late chief, Rai Dr. U. N. Roy Choudhury Bahadur, for allowing me to publish the case and also to the resident physician, Medical College Hospital, Dr. M. N. De, for his kind help rendered to me.

Special Article.

"MATHEMATICS AND MEDICAL RESEARCH."

By K. B. MADHAVA,

Professor of Mathematical Economics and Statistics, Mysore University.

Reviewing editorially the recently-issued second edition of Raymond Pearl's admirable book *Medical Biometry and Statistics* in the July number of the *Indian Medical Gazette,* the editor created for himself an opportunity to plead for a "better liaison between the mathematician and the clinician and medical research worker" (in India). The liaison that the editor desires is a liaison that the economist, the meteorologist, the research workers in agriculture and irrigation, the institutes for business forecasting in commerce, actuaries in insurance offices, etc., have achieved and are achieving. If the 19th century saw the triumph of physics through mathematical methods, the present is predominantly one where biology and sociology, nay even commerce and political science,* are evolving themselves into exact sciences with the spurts which mathematical methods give them. If physiology, bacteriology and immunology have brought grist to the mill of medical research, so also have statistical methodology and higher mathematics. The editor rightly observes "at every turn the research worker will find that he is hampered by his limited knowledge of mathematics and unless he has a 'mathematical sense' and a groundwork of mathematical knowledge he cannot expect to make much progress."

The editor's trouble, however, is with the "Napoleonic" preposterousness not only of the pure mathematician, but also of the medical men who make a special study of mathematics and then "go to the other camp." Where this is so, it is, of course, most regrettable, but I venture to point out that a great deal of this unnecessary gulf is artificially maintained in every science where borderland subjects exist by a prejudice, amounting almost to contempt, against the invader. No disposition is more inimical to the progress of science than this insulation, and from the "other camp" I can say that the medical man has greatly enriched even the pure domain of mathematics by his most complex problems. What mathematician would deny that Ross's "Calculus of happenings," Brownlee's "Theory of an epidemic," Kermack and McKendrick's "Mathematical theory of epidemics," Müller's "Law governing time variations of disease," Stock's "Analysis of the periodicity of measles," Hamer's "Synthesis of a model epidemic," Soper's "Interpretation of periodicity," Major Greenwood's method of "expectation of life" in experimental epidemiology, etc., are real contributions to mathematics *qua* mathematical method, altogether apart from the correlational and other calculus of a mechanical nature associated with most writings on epidemiology? My illustrations are necessarily limited to the subject of epidemiology, but such mathematical insight is not confined to this subject only. Pearl's logistic law applied to bacterial populations either from the point of view of Buchner and others, or from the autocatakinetic viewpoint of McKendrick and Kesava Pai, Lotka

* *The Statistical Method in Economics and Political Science* by P. Sargant Florence (Kegan Paul, Trench, Trubner and Co., 1929) is a valuable treatise on the quantitative approach to social, industrial and political problems.

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and Winslow, the whole theories of surface tension and tensile energy, the equations for calculating the electromotive force for a liquid-liquid junction ("membrane potential"), Northrop's explanation of the mechanism of agglutination, the conditions necessary in phagocytosis for a minimum of free energy, and Landsteiner's calculus of blood groups are other illustrations. In short the medical researcher is prescribed none too much of mathematics at any time. In an attempt to study multiple occurrences of diseases in the same house, even Karl Pearson confesses and complains of *his* deficient mathematical knowledge. He wrote (1911) "It has been recently half suggested that the application of mathematics to medicine does not need the highest mathematical powers and the most complete mathematical training. ....Now here is a case which absolutely confutes such a suggestion—just as it is confuted by almost every medico-biometrical problem that arises—..... Strange as the confession may seem, when I come to these medico-statistical problems, my regret is not for want of my medical training but for the extreme defectiveness of my powers of mathematical analysis."

The editor naturally asks how this liaison is to be brought about, and he suggests therefor the raising of the mathematical standard for qualifying as a medical student, the introduction of mathematics into the medical curriculum, postgraduate teaching, books of the type of Pearl's *Medical Biometry and Statistics*, the providing of "invaluable aid to research workers in Calcutta as well as in other parts of India" in the form of the chair of epidemiology and vital statistics at the new Rockefeller All-India Institute of Hygiene and Public Health to be opened in Calcutta, and so on. Does he also hint like J. B. S. Haldane ("Should research in pure sciences be rewarded?") that because success in clinical medicine brings its own lucrative practice, the research worker whose statistical method puts him in possession of this useful knowledge must have his prior share of the gains of learning? All these and others like these have their recommendations as well as their limitations, but as one who has had some experience in his own and other universities in the devising, and conducting, of courses of study of applied mathematics to economics and life assurance, to sociology and biometry, to mental, social and educational measurements, and so on, I feel I ought to say that in order to get the best results out of an investment of our efforts, these borderland courses ought to be limited to those actually engaged in research, to those who really need them or are hindered by their absence. There is I believe no real difficulty in picking up anything, however hard or abstruse, when its necessity is proven. Heaps of examples may occur to our readers which illustrate the spirit with which a willing worker could undertake a task, or the service which a master mind can render in inspiring others. The facilities which Indian researchers can boast of are too few—library facilities, laboratory and field work opportunities, guidance in the selection, conduct and completion of research problems are all recent in origin and slight in proportion to the need. In the preparation and presentation of research work that sees the light of publicity there is even now little or no assistance. Between the sensitiveness of authors, the reluctance of the busy specialists and referees, and the over-anxiety of editors to fill their journals, or in their condescending practice of a policy of *laissez-faire*, I am certain that a large number of manuscripts fail to receive the thorough and comprehensive recasting and finishing that a paper ought to have prior to publication. There is doubt whether or not the editor's duty should consist only in pronouncing the verdict "accepted" or "rejected," avoiding the task of offering helpful suggestions in the revision of a manuscript, but there can be no doubt whatever that at present no assistance or "editing" *is* given in the statistical and mathematical parts of our published papers in medical and public health research. H. L. Dunn (1929) said in a most remarkable paper which I fancy will bring unction to our editor, even as Pearl's *Medical Biometry and Statistics* did, that 25 per cent. of American papers which ought to contain statistical or mathematical methods do not contain them, 50 per cent. contain them in an incomplete form, and another 24 per cent. contain inaccurate analyses. I do not know how to express the corresponding situation in India in fair and pleasing terms. May I point out, with the editor's permission, that, from the statistical point of view, some of the papers published in the recent numbers of this *Gazette* itself are open to considerable criticism: to be precise, "The *Anopheles stephensi* problems in Calcutta," "Blood groups and heredity," "Halometric readings in Indians," and "Anæmia of pregnancy"? It is, in my opinion, imperative that the editing, or some prior process, should be most severe, and should include analysis, verification, extensification and recasting, based upon an expert referee's opinion. Editorial boards, where they exist and are not merely ornamental, must, in my opinion, include at least by co-option real active experts who will tuck up their sleeves, work out the results and suggest helpful criticisms to the authors. This, I am sure, by the method that it involves of introducing mutually the expert and the field worker, will be productive of most good, and the second or third paper of such field workers will most probably be *pucca*. Some editors would assume that such assistance has already been sought, or should be sought by the workers themselves in their self interest.

May I, at the risk of taking up a little more space, illustrate this point with reference to

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the last-mentioned paper "Anæmia of pregnancy" (Mitra, 1931), obviously not because I have anything but the greatest respect for that great social worker of Calcutta, but conveniently because it is on my table at the moment? Moreover I have handily some comparative data of my own for which I am obliged to Drs. J. F. Robinson and Captain who gave me access to their data, and to Messrs. V. N. Poornapregna, M.A., and K. V. Krishnasastry, M.A., workers in my department, who analysed these figures.

It is very desirable that crude data should be published as in this paper. Where printing costs prohibit such publication, the data, tabulated preferably on cards, must invariably be available to enable the journal's statistical referees to examine the data.

Community.—If any comparison, as between Hindus and Mohammedans, is to be made, the result must be stated unambiguously. Thus, retaining the author's assumptions regarding departures from hospitals before parturition, the results must be stated as follows:—

	Pregnancies.	Deaths.	Probability of fatality with probable error.
Hindus	79	20	.2532 ± .0330
Mohammedans.	7	5	.7143 ± .1152

Excess of fatality in Mohammedans is .4611 and this is 3.85 times its probable error, .1197. Hence the difference *is significant,* the odds against the occurrence of a deviation as great as, or greater than, this being 80 to 1. For instructions in regard to this method of procedure, I would give reference for a medical researcher to a medical book, such as Stallybrass's *Principles of Epidemiology* (1931, pages 55–58) and not to any treatise on statistics. Of course it should also be noted that if the numbers were fewer than these the methods in Pearson's *Tables for Biometricians and Statisticians* (pages lxxi–lxxiii) should be used—*e.g.*, "In a batch of 79 recruits 4 were found syphilitic; what number may be anticipated in a further batch of 40?" or "Of 10 patients subjected by a surgeon to a given operation only one dies; a second surgeon in performing the same operation on 7 patients, presumably equally affected, loses 4 cases. Would it be reasonable to assume that the second surgeon had inferior operative skill?"

In regard to the actual problem raised, the author's data answer nothing. He has not stated the composition of Hindu and Mohammedan communities in his 1,883 labour cases, which prevents the calculation of morbidity and mortality rates. In our data (unpublished, probably to be submitted by my department to the Indian Science Congress, 1932), we find:—

V. V. Maternity Hospital, Mysore, 68 months (May 1924—December 1929).

	Labour cases.	Maternal deaths (all causes).	Probability of mortality with probable error.
Hindus	3,899	116	.0297 (5) ± .0018
Mohammedans.	636	16	.0252 ± .0042

Excess in *Hindu* mortality is .0046 and is just once its probable error, .0045; hence the difference is *not* significant. In these circumstances the author's finding (of a significant excess fatality in anæmia of pregnancy among Mohammedans)—obviously of great sociological interest—needs to be established with completer details.

Age.—The author's remarks that "Anæmia of pregnancy occurs at any age between 15 and 40, but the greatest frequency is at the 25th year as shown in our series (graph I). It is rarely seen below 15, or above 40" are not at all scientifically expressed. *All* pregnancies are usually in these ranges of ages, and if it has to be established that the distribution of cases in one does not differ from that in the other, then it is a definite statistical problem which must be fully analysed. The author should have compared the frequency distributions of his 86 specific patients and all the 1,883 cases of his hospital. Replacing for the latter a series of 767 pregnancies for which I have age records, I find the following statistical constants:—

	N.	Mean age with probable error.	Standard deviation.	Coefficient of variation.
Calcutta, Seva Sadan (anæmia pregnancies).	86	24.30±0.43	5.86	24.1
Mysore, V. V. Hospital, 68 months. (All pregnancies.)	767	24.63±0.14	5.83	23.9

(Data grouped in quinquennial age periods for purposes of calculation.) Thus in the mean age, and in the absolute or relative variability of occurrence the two age distributions are in great accord with each other implying (subject to the Calcutta and the Mysore figures being comparable) that the risk of anæmia of pregnancy is equally severe at all ages. This piece of analysis is a very common work: *e.g.*, Stallybrass, chapter III. When more refined work, such as computation of "goodness of fit" is needed, the method should be picked up from, say, Fisher's *Statistical Methods for Research Workers.*

I do not, however, agree with the author's making out the age of 25 as being of greatest frequency. It is a case where reliance on raw or untreated data would mislead—he has 13 cases at age 25 which is the largest at any single age, but of course our age reporting is proverbially defective and largely preferential towards quinquennial endings. The error

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introduced by this demographic feature is greatly reduced by grouping in quinquennial periods; this keeps the multiples of five at the centre of each period. On so treating the author's data, I find his frequencies to be:—

Age periods ..	13 to 17	18 to 22	23 to 27	28 to 32	33 to 37	38 to 42
Cases	5	36	22	16	3	4

His mode is now shifted to the age period 18 to 22.

Parity.—It is noted that "multiparous women are more commonly *affected*" (italics mine), apparently because there are 20 first-parity occurrences and 66 others. But there can be no contrast of one single parity with a large number of possible parities at the other end. If, however, the real implication of this statement is that the incidence of anæmia is more common in later pregnancies than in the first, the statistics should be rendered thus: "out of N first parities there were 20 anæmias; and out of (1,883—N) multiparas there were 66 anæmia occurrences," and the question answered as in the case of "Community," *supra*, whether or not there really is differential incidence. It does not, however, appear to be so because in my series of 756 "general" pregnancies, 196 were of first parity ($p = .2593 \pm .0047$), whilst the similar probability in the 86 anæmia pregnancies was $.2326 \pm .0130$ and the consequent shortage of first parity in anæmia cases is $.0267 \pm .0138$ which is *not* significant. Neither do the other customary statistical constants show significant differences:—

	N.	Mean parity with probable error.	Standard deviation.	Coefficient of variation.
"Anæmia" (Calcutta).	86	3.84 ± 0.20	2.71	70.6
"General" (Mysore).	756	3.52 ± 0.06	2.50	71.0

The difference in the mean parity (0.32 ± 0.21) is such that the odds are 2.2 to 1 that even larger differences may occur.

Seasonal variation.—This is always a tempting idea in research but doubtless the most difficult to establish. The author's graph II may be considerably distorting the picture unless due adjustments are made for secular trend, for equal numbers of identical months, and a number of other factors, but it is most unsafe to deal with such scanty data. Out of 86 cases, 15 are of 1927, 17 of 1928, 5 of 1930, 1 undated and the remaining 48 are of 1929. Taking the last only, it is possible to construct some evidence for periodicity or excess of attack in the second half of the calendar year, but one year's data are quite insufficient. If analysis *must* be made, something like the following may be attempted:—

Year 1929.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number in each month.	1	0	1	4	3	**5**	**7**	**5**	**5**	**6**	4	**7**
Ditto + the month following.	1	1	5	7	8	**12**	**12**	**10**	**11**	**10**	**11**	8
Ditto + the 2 months following.	2	5	8	12	**15**	**17**	**17**	**16**	**15**	**17**	12	8
Ditto + the 3 months following.	5	8	13	**19**	**20**	**22**	**23**	**20**	**22**	**18**	12	9
Ditto + the 4 months following.	8	13	20	**24**	**25**	**28**	**27**	**27**	**23**	18	13	13
Ditto + the 5 months following.	13	20	**25**	**29**	**31**	**32**	**34**	**28**	23	19	17	16

Had there been no monthly irregularity, out of the 48 admissions in the year 4 should have occurred in each month, 8 in two, 12 in three, 16 in four, 20 in five and 24 in six consecutive months. Totalling up as above, we are able to locate places (marked in heavy type in above table) where excessive admissions occurred:

July and December in one-month periods show relative excesses of 75 per cent.;

June-July, July-August in two-month periods show relative excesses of 50 per cent.;

June-August, July-September, October-December in three-month periods show relative excesses of about 42 per cent.;

July-October in four-month periods show a relative excess of about 44 per cent.;

June-October in five-month periods show a relative excess of about 40 per cent.; and

July-December in half-yearly periods show a relative excess of about 42 per cent.

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But as already indicated one year's experience cannot be generalised, and the author has necessarily to lean on other grounds for his suggestion that "there may be some factors in this part of the year which favour the production of toxins in the body."

Œdema, diarrhœa, fever, etc.—To ascertain whether or not there is any association between œdema, diarrhœa, fever, etc., in anæmia and maternal mortality, or whether deaths happen just as frequently in the presence as in the absence of these additional complaints, the data have to be written in the following "tetrachoric" form and the statistical procedure described in *Tables for Biometricians and Statisticians* (pages xxxiv-xxxvi) should be adopted:

Mother.	Œdema.		Diarrhœa.		Fever.			Child born.		Total.
	+	−	+	−	+	−	Total.	Still or died soon after.	Living.	
Dead ..	20	5	12	13	12	13	25	21	1	22
Not dead ..	51	10	27	34	19	42	61	18	27	45
Total ..	71	15	39	47	31	55	86	39	28	67

From the statistical constants derived from these data, and given below, it would appear that there is no significant relation whatever of prognostic value between the presence of œdema, diarrhœa and fever, and maternal death, whilst there is a fairly good association in the occurrence of the compound event of stillborn child and death of its mother:

Maternal death.	χ^2.	C_2.	Order of P.
(1) Œdema ..	.09996	.0012	1
(2) Diarrhœa	.15016	.0017	1
(3) Fever ..	2.1846	.0248	0.54
(4) Child also dying or stillborn.	18.679	.2180	0.0003

"The best method of inquiry at present for relative association in the case of fourfold table is, I hold" writes Karl Pearson, "first to investigate P and throw out as not associated those cases....." like (1), (2) and (3) above, and "then to use either tetrachoric r_t or C_2 according as we are justified in considering the variates as continuous or not." For these more refined methods I would employ either *Tables for Biometricians* (pages l-lii) or what Brownlee has frequently employed in his papers on smallpox and vaccination (*Biometrika*, Vol. IV), a formula due also to Karl Pearson, but I think all these are unnecessary for the present purpose. The association between stillbirths and maternal mortality seems, however, to be well marked: in my own data whilst I found 599 stillbirths in 4,903 deliveries ($p = .1222 \pm .0032$), there were as many as 76 stillbirths among 137 maternal deaths ($p = .5548 \pm .0286$), an excess in the latter of $.4326 \pm .0288$ which is certainly significant. [Of course among hospital deliveries there is bound to be a large number of complicated cases, and hence such a large number (599) of stillbirths, almost 1 in 8.] I may state also in conclusion that my data are not in a form to ascertain the number of anæmia cases in pregnancy, but in the 138 deaths for which I have statistics, "descriptive condition at death" is noted on 61; among them 9 are marked "anæmia," and 4 more "anæmia in association with diarrhœa," "spleen," "albuminurea" and "V. D. H." respectively.

My excuse for writing this somewhat long note is not to support the *obiter dicta*, "surely the average medical man is the most unscientific," but to agree with the editor that the mathematical co-operator should be welcomed, or even sought after, for all papers amenable to statistical or mathematical analyses, before they are published.

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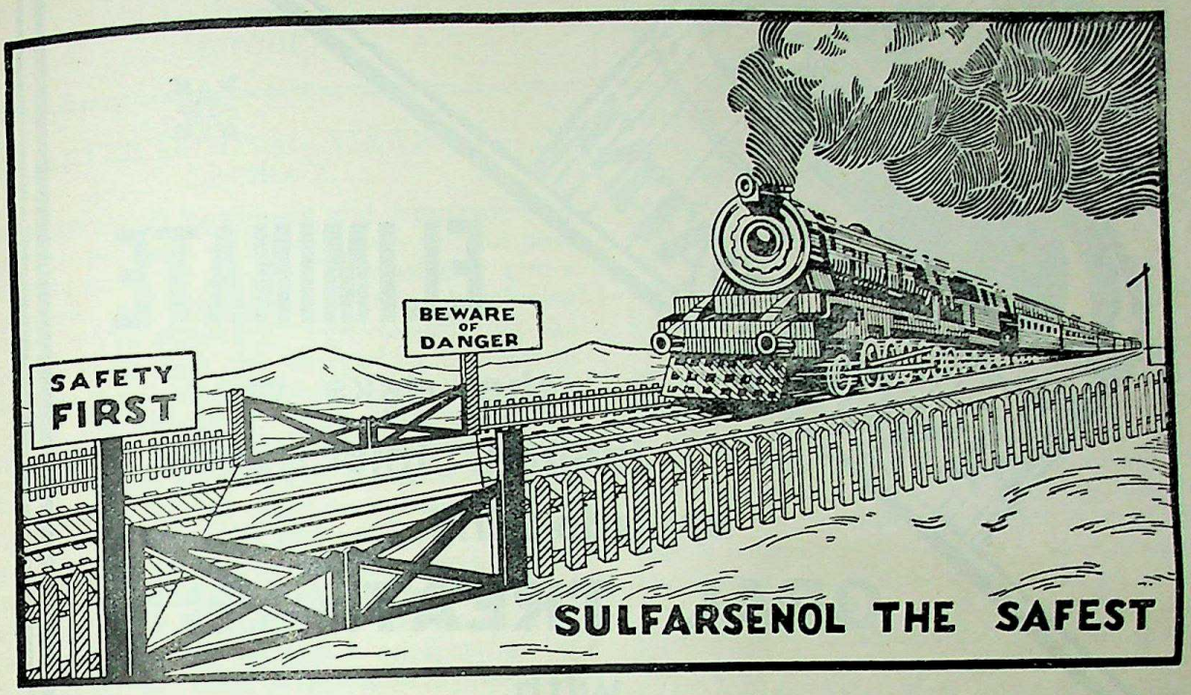

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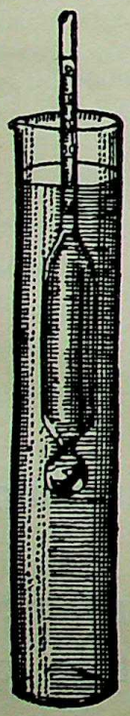

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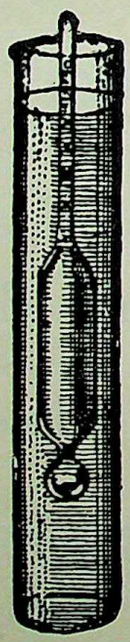

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Indian Medical Gazette.

OCTOBER.

THE INTERNATIONAL VIEWPOINT IN LEPROSY.

The efforts of hygienists and leprologists to solve the problem of leprosy have in the past been hampered by a series of obstacles many of which are peculiar to this particular problem. The number of workers devoting the whole of their time and energies exclusively to leprosy work is relatively small, and their fields of work are scattered; since 1914, when the journal *Lepra* ceased publication owing to the outbreak of the European War, there has been no common means of inter-communication between workers in different areas; as a direct consequence misunderstandings have been frequent and ancient prejudices based on worn-out dogmas have flourished. Finally, there has been no adequate appreciation of the fact that the manifestations of leprosy and the gravity of the problem vary in different endemic areas and that anti-leprosy measures deemed adequate in one area may well be totally inadequate or inapplicable in another.

Realising the importance of gaining an insight into certain of the essentials of the leprosy problem the Leprosy Commission of the League of Nations sent its Secretary, Dr. Et. Burnet, on a study tour. During the period January 1929 to June 1930, Dr. Burnet visited the Baltic countries, the South American republics, India, the Malay States, Java, the Philippines, South China, Japan and Honolulu. In view of the very wide area comprised in the itinerary a not inconsiderable proportion of the time was spent in travelling from place to place and the period that could be allotted to the study of conditions in any given area was perforce very short. In the nature of things, therefore, the report of this tour, which was published by the Health Organisation of the League towards the close of last year, makes no pretence to be anything more than a very rough outline. If, however, this report fulfils no other function it serves to throw into relief the amazing diversity of conditions prevailing in countries where leprosy is endemic and the even greater diversity of opinion among competent leprologists on what is essentially the crux of the whole problem, *viz*, the efficacy of the modern treatment of leprosy by means of the chaulmoogra-hydnocarpus group of oils and their derivatives.

It is not our present purpose to discuss this much-vexed question. Briefly, however, it appears that leprologists are roughly divisible into three groups—the enthusiasts who, to quote Dr. Burnet, declare that "to be lukewarm about treatment is as great a crime as to refuse quinine to a malaria patient or arsenobenzol to a person suffering from syphilis"; the moderates, who administer the chaulmoogra-hydnocarpus group of oils or their derivatives in the belief that they do *some* good but who none the less recognise clearly that, in the present state of our ignorance, as much, if not more, progress is to be looked for by the introduction of general hygienic measures such as the abolition of undesirable social customs and improvement in dietetic habits—by the introduction, in short, of measures designed to raise the general standard of living of the community; and the therapeutic nihilists, who deny that these remedies are of any value whatever and who point out that their efficacy has never been compared with that of other drugs administered to a sufficiently large number of clinically comparable cases living under identical conditions. At the moment, therefore, there is no consensus of opinion among leprologists regarding the efficacy of the modern therapeutic treatment of the disease. From the purely scientific point of view it is highly reprehensible to recommend for general use a line of treatment the efficacy of which has not been proved under rigid scientific conditions; but we must take a broader view of the question—however much we may deplore the haphazard way in which the value of the modern treatment of leprosy has been tested, we cannot doubt that the sudden wholesale abandonment of this line of treatment on the ground that it is unscientific, and a return to the view that leprosy is still an incurable disease would deprive the patient of that hope of recovery which in this, as in many other chronic diseases, is in itself a powerful therapeutic agent.

Of even greater importance, however, than Dr. Burnet's study tour was the conference held in the Philippine Islands in January of this year; this conference, made possible only by the generosity of the trustees of the newly formed Leonard Wood Memorial for the Eradication of Leprosy, was in many respects unique. It assembled in an area which is at one and the same time heavily infected with leprosy and the site of one of the most vigorous and successful anti-leprosy campaigns of modern times; the delegates were strictly limited in number and were as far as possible chosen from among those actively engaged in anti-leprosy work; finally, the discussions were of an informal nature. The report of this conference has just come to hand and from a perusal of it one quickly realises that the delegates did not spare themselves. Despite the fact that they were in session for 14 days only, during which time also visits were paid to several regional treatment stations and to the Culion Leper Colony, every aspect of the problem was carefully considered with the exception of prophylaxis which had been dealt

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with specifically by the Bangkok Meeting of the Leprosy Commission of the League of Nations in December 1930.

Here we cannot hope to do more than indicate in the briefest outline the salient features of the report. At the very outset the necessity for "the international viewpoint" is stressed and the initiation of study tours and of transfer of personnel is urged. The existing terminology has been thoroughly overhauled and a new classification of the types of leprosy proposed which it is hoped will permit of less widely divergent interpretations and will enable the views and results of different leprologists to be more accurately correlated. The question of treatment is considered and important data are laid down for the evaluation of progress and for the follow-up of patients. Under the heading "Research" the necessity of co-ordination is stressed and the report submits a programme of subjects which seem to be in urgent need of investigation.

The last, but by no means the least, important activity of the conference consisted in the inauguration of an international organisation in order to facilitate inter-communication and collaboration between those engaged in leprosy work. The need for such an organisation has long been obvious and several attempts have been made to bring such a body into being; no success has hitherto attended these efforts probably owing to the absence of the necessary funds. The last effort of the kind was made in 1925-26 when the so-called Société Internationale de Leprologie was founded in Paris; its appearance in the world was signalised by an impressive flourish of trumpets, but it seems to have been still-born. The organisation that came into being in the Philippines starts its career under much happier auspices. The name of the organisation is the International Leprosy Association (Association Internationale de la Lèpre); its functions are: "To encourage and facilitate mutual acquaintance and collaboration between persons of all nationalities concerned in leprosy work and the co-ordination of their efforts; to facilitate the dissemination of knowledge of leprosy and its control; and in any other practicable manner to aid in the anti-leprosy campaign throughout the world; and to this end to publish a scientific journal of leprosy. It shall endeavour to co-operate with any institution or organisation dealing with leprosy work."

The details of the constitution and bye-laws of the Association appear to have been very carefully thought out; among those elected to the temporary general council are men of international reputation in the field of leprosy and, perhaps most important of all, the Association will almost certainly have the powerful financial backing of the Leonard Wood Memorial during its early critical years.

The prospects for the successful co-ordination of anti-leprosy activities appear to be brighter now than they have ever been—the slightly parochial outlook which in the absence of effective liaison has tended to characterise the efforts of the individual worker will now, we trust, give place to an era of ever-increasing co-operation and inter-communication between leprologists and hence to a more effective prosecution of the anti-leprosy campaign.

FADS AND FASHIONS IN INDIGENOUS MEDICINE.

Practitioners of the ancient systems of medicine frequently accuse us, of the modern scientific school, of continually changing our methods; but this, we claim, is the only way that progress can be made. We do not change our minds from sheer perversity, but because new scientific methods have thrown a light into places that were previously dark and have enabled us to see clearly things that we could not see before, or of which we were only able to get a vague impression. The followers of the ancient systems say, 'What is good for the patient to-day, must be good for him to-morrow, or ten years hence.' That may be so, but we are more modest and say, 'What we *thought* was good for the patient ten years ago, we now, in view of our more complete knowledge, know is not the best.'

Nevertheless it is the fads and fashions of modern medicine that bring on us the criticism of thinking men and women; they cannot believe that science moves sufficiently fast to justify the relegation to the scrap heap of a remedy which only the year before was shouted from the house-tops as a panacea for all ills. The practitioner is not alone to blame; on the one side he has the continual shower of most plausible advertisements from pushing drug manufacturers, and on the other foolish patients who consider that the newness of the remedy is the measure of his ability. Little wonder that he succumbs to the one and panders to the other. Fads and fashions are by no means confined to remedies; most of us can remember the succession of fashionable diagnoses that have reigned for longer or shorter periods, from the days when King Edward gave appendicitis its first real start, to the present day of 'blood pressure'; or are we behind the times, and has this been superseded?

One is liable to think that indigenous systems of medicine are all of an ancient and unalterable character. This is, however, not so, and apparently such systems, at any rate those practised in Burmah, also have their fads and fashions. Not many years ago a new disease made its appearance in Burmah. The stories which were circulated about it were so alarming and created such an impression in the country that government ordered a committee of enquiry to go into the matter and report. This report was printed a few years ago, but

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it was not widely circulated and a copy has only recently come into our hands. Its interest is psychological rather than pathological, as the writer of the report himself states; nevertheless, we feel that the story is too good to remain buried and forgotten in an official report.

The story is very like that of the king who wore a garment which, he was told, was only visible to the 'really good.' So neither he himself, nor any of his subjects, would admit that they could not see it, though in actual fact there was no garment at all. In the Burmah story the patients suffered from a disease, *makawlam*, the main symptom of which was fever, and the outward and visible sign white, red, or black blebs, according to the degree of severity of the attack, around the anal margin. The patient didn't know he had the blebs, as they were not painful at first; no ordinary person could see them; but a good *say saya* could. If a *say saya* couldn't see them, he wasn't a *good say saya;* so most *say sayas* saw them. The treatment was to lance the blebs—after this the patient usually knew that he had *makawlam*, and, if he survived, his convalescence was painful. The end of the story—at least, it is the end as far as we know—is that Colonel Morison, who investigated this disease, failed to prove himself a good *say saya;* he failed to see any white, red, or black blebs, but he found malarial parasites in the blood of the large majority of the *makawlam* patients, and he cured the disease by the administration of quinine.

We have given a résumé of Colonel Morison's report on his enquiry into this 'disease' in our 'Reports' section.

Current Topics.

Ovarian Cyst Complicating Pregnancy.

By CHARLES E. CAVERLY, M.D.

(Abstracted from the *American Journal of Obstetrics and Gynæcology*, Vol. XXI, No. 4, April 1931, p. 566.)

Summary.

1. The presence of an ovarian cyst seems to militate against impregnation. However, it is not incompatible with normal pregnancy, labour, and puerperium.

2. At the same time, an ovarian cyst is a serious complication of pregnancy, which, in hospital practice, is met with in about one in every 510 cases. It is seen with almost equal frequency in primigravid and in parous women.

3. In a series of 83 cases, the cysts were almost equally distributed, as to their character, between dermoids and cysts of other varieties, and as to their location, between those lying within the true pelvis and those above the level of the brim.

4. Subjective symptoms were noted in 56.2 per cent. of the cases during pregnancy, and in 6.8 per cent. during the puerperium.

5. Major complications of the cyst occurred in 21.7 per cent. of cases during pregnancy, and in 7.2 per cent. in the puerperium.

6. Both subjective symptoms and cyst complications during pregnancy and the puerperium were far more frequent with abdominal than with pelvic tumours, and more frequent with cysts of other sorts than with dermoids.

7. Ovariotomy is indicated in every case of pregnancy complicated by ovarian cyst. It should not be done during the first two months of pregnancy because of the possibility of removing the corpus luteum. If the presence of the cyst is first diagnosed in the last month of pregnancy, one of two courses would seem to be indicated: either to wait until full term and then do a Cæsarean and ovariotomy, rather than subject the fresh cicatrix of a recent operation to the strain of labour; or else, if labour and delivery promise to be uncomplicated, to let them occur normally, and then do an ovariotomy early in the puerperium. When the diagnosis of ovarian cyst is first made in the puerperium, ovariotomy should be performed forthwith.

Acute Intestinal Obstruction.

By ALTON OCHSNER.

(Abstracted from the *International Medical Digest*, Vol. XVIII, No. 4, April 1931, p. 205.)

THE symptoms of acute intestinal obstruction are dependent upon a number of factors. In addition to an obstruction to the fæcal stream, patients with acute intestinal obstruction may have varying degrees of hypochloræmia and toxæmia. In those cases in which the obstruction is relatively low in the intestinal tract, that is, within the colon or lower small bowel, the patient may have relatively few symptoms, except those dependent upon the mechanical hindrance to the intra-intestinal contents. Such an obstruction may exist for relatively long periods of time without the life of the patient being seriously jeopardized. In contrast to this relatively benign course, an obstruction in the upper portion of the intestinal tract produces marked symptoms and the course is rapid and progressive, resulting in the death of the individual within a period of days if the obstruction is not relieved. These symptoms are much more marked, both in high and low obstruction, if, in addition to the mechanical obstruction of the intra-intestinal contents, there is an interference with the blood supply of the gut.

In all cases of mechanical obstruction, there is an attempt on the part of the intestinal tract to overcome the obstruction by increased peristalsis, which is responsible for the cramp-like pain complained of by patients with mechanical ileus.

There also occurs a reversed peristalsis in the intestinal tract, resulting in vomiting. As the result of the loss of fluid and hydrochloric acid in the vomitus, dehydration and hypochloræmia occur. Associated with the decrease of the blood chlorides, there is a rise in the carbon dioxide combining-power of the plasma (alkalosis).

That dehydration, hypochloræmia, and alkalosis cannot account for the entire group of symptoms in high intestinal obstruction and in low intestinal obstruction in which there is interference with the blood supply to the gut, is evident, because a correction of these factors is of no avail. There exists some additional factor which is undoubtedly a toxæmia, the toxin being derived from the lumen of the obstructed gut. Concerning the origin of these toxic products there are these theories:

1. Toxins resulting from putrefaction of stagnating food within the intestinal tract.

2. Toxins arising from bacterial invasion of the obstructed gut.

3. Intoxication resulting from the absorption of abnormal secretions in an abnormal way or secretions which have not been detoxified.

4. Intoxications produced from absorption of perverted intestinal secretion.

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None of these theories has been proved, but there is considerable experimental evidence to support the last three.

It is essential to distinguish between the mechanical and the adynamic varieties of ileus from a standpoint both of prognosis and treatment. The differentiation is, however, not always easy, because the adynamic variety frequently follows and may be superimposed upon the mechanical variety. The mechanical variety of ileus fortunately occurs much more frequently and offers a better prognosis. One of the earliest symptoms produced by mechanical obstruction of the intestine is pain, which is characteristically colicky and intermittent. In acute intestinal obstruction obstipation is often lacking, and no dependence should be placed upon this symptom. In fact, not infrequently following the onset of the patient's symptoms one or two evacuations of the bowel occur, probably due to the hyperperistalsis in that portion of the gut below the obstruction. Vomiting may be an early symptom, especially in obstruction high in the intestinal tract. Examination of the abdomen often reveals nothing of significance, especially in high intestinal obstruction. In acute intestinal obstruction located in the distal portion of the intestinal tract, there may be considerable distention proximal to the obstruction. The absence of distention, however, should never cause one to hesitate in making a diagnosis of acute intestinal obstruction. Auscultation of the abdomen is extremely important in those cases in which an intestinal obstruction is suspected. Early in the course of mechanical obstruction there is a marked increase in peristaltic activity, which can be elicited by auscultation. In the adynamic variety, in contrast to the normal peristaltic sound, the abdomen is "ominously silent."

An extremely important diagnostic procedure in acute ileus, both in the mechanical and adynamic varieties, is roentgenography of the abdomen without the use of contrast media. Because of the increased secretion and diminished absorption from the gut proximal to a mechanical obstruction or in loops of gut in adynamic ileus, there is an accumulation of fluid and gas within the gut. A roentgenogram obtained in such a way that localized gas collections above fluid levels within the loops of gut can be visualized on the roentgenographic plate, is diagnostically of immense value. Technically, this may be obtained by securing an anteroposterior roentgenogram of the abdomen with the patient in the upright position, either sitting or standing. In those patients who are too ill even to sit, a plate may be obtained with the patient on either the right or left side. The finding of multiple fluid levels capped above by gas is pathognomonic of acute intestinal obstruction.

The prognosis in intestinal obstruction depends not only upon the level of the obstruction, but also upon the type of ileus, whether it is of the mechanical or the adynamic variety. Of great importance, also, is the time of operation; the earlier the operation, the better the prognosis.

Of most importance in the treatment of acute intestinal obstruction is early recognition of the condition, so that prompt therapy may be instituted. Much has been accomplished, both preoperatively and postoperatively, by the prevention and treatment of the hypochloræmia in these patients by the intravenous and subcutaneous administration of sodium chloride solution. Large quantities of 1 per cent. sodium chloride solution should be given intravenously as a preoperative measure. Gastric lavage is of extreme importance, especially preoperatively, in order to empty the stomach of the retained gastric and intestinal contents. Because of the danger of aspiration from the intestinal tract, general anæsthesia should not be employed in acute intestinal obstruction. Preferably spinal or splanchnic analgesia, combined with local infiltration of the abdominal wall in the latter, are the methods of choice. The operative procedure varies with the lesion encountered. It is imperative that the obstruction be relieved in some manner. Frequently no attempt should be made to extirpate the obstructing lesion, because the operative trauma may be more than the patient can survive. There is probably no condition which requires more gentleness than acute intestinal obstruction. In such a case the operative procedure of simple drainage of the intestine above the obstruction is the method of choice. High enterostomy is also at times life-saving.

Postoperatively, following the relief of the obstruction, the treatment is of extreme importance. Nothing should be administered by mouth until peristalsis is again re-established. Patients should receive large quantities of fluids, from 3 to 4 litres in 24 hours, the fluid consisting either of a normal or 1 per cent. sodium chloride solution together with a 5 per cent. sodium glucose solution intravenously, normal saline hypodermatically and either physiologic saline solution, 2 per cent. glucose solution, or tap water per rectum. Repeated determinations of the blood chlorides and the carbon dioxide combining-power of the plasma should be made, and any hypochloræmia should be combated by increasing the amount of the sodium chloride administered. Gastric lavage should be employed until all nausea and vomiting have ceased. The application of heat to the abdomen by means of electric-light tents is of immense value in re-establishing peristalsis.

The treatment of the adynamic variety of ileus, either as a primary lesion or that superimposed upon a mechanical ileus, is more difficult than the treatment of the mechanical variety. Splanchnic block, either as a splanchnic or spinal analgesia, is of value in those cases in which too marked changes have not occurred within the gut wall. It has recently been found experimentally that splanchnic analgesia is more efficacious than spinal analgesia.

Drugs in the treatment of ileus are of relatively little value, physostigmine and hypertonic sodium chloride solutions giving the best results.

Pleural Effusion.

By L. S. T. BURRELL, M.D., F.R.C.P.

(Abstracted from the *British Medical Journal*, April 11th, 1931, p. 619.)

Pleural effusion occurs under several conditions, and its treatment is largely dependent on the cause and character of the fluid. For practical purposes effusions may be considered as either clear or thick, and I suggest the following classification.

A. Clear effusion.

Causation.	Appearance.	Coagulable Protein.	Specific Gravity.	Cytology.
1. Transudates:		Per cent.		
Renal	Very pale	2	1008	Endothelial cells.
Cardiac	Pale yellow	3	1016	
Neoplasm	Pale yellow or hæmorrhagic.	3	1016	
2. Exudates:				
Tuberculous	Straw colour	Over 4	1020	Small lymph
Pyogenic	Turbid yellow	Over 5	1024	Polymorph.

B. Thick effusion.

1. Non-purulent opaque fluids vary from the cloudiness due to a slight excess of cells to the dense opacity of true chylous effusions. The density may be increased by the presence of blood. A true hæmothorax is usually the result of trauma, but bleeding with an effusion is not uncommon, especially in malignant disease; it occurs in about 50 per cent. of cases of carcinoma of the lung. Hæmorrhage does occur

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in tuberculous and other effusions, and should not therefore be taken as diagnostic of neoplasm. The fluid may be rendered opaque by the presence of cholesterol in an effusion of long standing, or by cells which have undergone fatty degeneration. True chylous effusions are not common, but may occur as a result of occlusion of the left subclavian vein, injury to the thoracic duct or pressure on it by tumours, or by filariasis.

2. Purulent effusion or empyema may be due to one of many causes, such as malignant disease, ruptured abscess of lung, septic emboli, actinomycosis, etc., but for practical purposes it may usually be considered as (*a*) pneumococcal, (*b*) streptococcal, or (*c*) tuberculous.

Clear effusion.

Before considering treatment I should like to say a little more about the laboratory findings of these fluids. On microscopical examination a few red corpuscles are usually seen. Their presence may be due to bleeding as a result of the pleural puncture, but they are not of clinical significance unless they are sufficiently numerous to be observed by the naked eye. Polymorphonuclear cells may also be present in proportion to the red corpuscles, but if these white cells are in excess it suggests that the fluid is due to a pyogenic organism, and that it will probably become purulent.

Hydatid fluid may be confused with pleural effusion; it is characterized by the presence of hooklets, not of eosinophil leucocytes. Usually it is like water, but during suppuration it resembles water into which one or two drops of milk have been put. Small lymphocytes occur in chronic inflammatory conditions, the commonest example of which is tuberculosis; therefore an excess of small lymphocytes strongly suggests this disease.

The absence of tubercle bacilli should not be taken as evidence that the condition is non-tuberculous, for these organisms are hardly ever found in the early stages of an effusion unless a very large quantity of the fluid is used. The bacilli can usually be found in long-standing effusions, and they are present in almost every case of tuberculous empyema.

Treatment of clear effusions.

When pleural effusion forms in a case of renal disease it is usually bilateral. Repeated aspiration is necessary, as the fluid tends to re-accumulate quickly. In cardiac cases it is best to remove the fluid early, as even a small collection in the pleural cavity embarrasses the heart. In the case of neoplasm, aspiration is necessary only when dyspnœa or pressure symptoms make the patient uncomfortable.

Most of the cases are tuberculous, and I think every case of pleural effusion should be regarded as of tuberculous origin unless some other definite cause for it can be found. It is necessary to take a few cubic centimetres of the fluid for analysis as soon as a diagnosis is made, but, apart from this, I think aspiration should not be performed except for one of three reasons:

1. To relieve urgent pressure symptoms, or to treat a case in which the fluid is not absorbing naturally.
2. To convert an effusion into a pneumothorax if the underlying lung has active disease.
3. To allow the lung to re-expand if there is active disease spreading in the other lung.

With regard to the first indication, it is not often necessary to aspirate, as almost always the fluid becomes absorbed in time. There is usually a rise of temperature at the beginning; this may continue for several weeks, suggesting an empyema, but in time the temperature will fall without aspiration, unless there is active disease in the lung. If the temperature persists and the patient is ill after six weeks, some of the fluid should be aspirated, but if more than 10 ounces are removed it is best to replace the fluid with air or oxygen. Air should be used if it is intended to make a permanent pneumothorax, but oxygen, which is more quickly absorbed than air, is indicated if one wishes the lung to re-expand. If, in spite of removing some of the fluid, the temperature does not settle, the remaining fluid should be completely aspirated and replaced with air or oxygen. In this case, however, it is almost certain that there is active disease in the underlying lung, and as the lung re-expands it should be carefully examined for any sign of disease, and repeated *x*-ray examinations should be made. One must remember that tuberculosis starts in the lung and spreads into the pleura; it does not start in the pleura and spread back into the lung; consequently when one sees a case of pleural effusion one should assume that there is disease in the lung, although in most cases it is not active, and does not develop into clinical disease. Some 40 per cent. of cases, however, do go on to clinical tuberculosis, and for this reason it is necessary to keep a patient under careful supervision and give him thorough after-treatment following pleural effusion.

When the fluid is examined the only organisms found are tubercle bacilli, and in the great majority of cases these can be demonstrated after the first two months. An effusion forms in practically every case of spontaneous pneumothorax due to tuberculosis, but in those cases where air is quickly absorbed and there is no effusion the patient makes a complete recovery, and subsequently no evidence of tuberculosis can be found.

When an effusion occurs during treatment by artificial pneumothorax it keeps the lung collapsed so that the intervals between the refills can be increased by weeks, or even months. The fluid may remain clear and unabsorbed, but there are two dangers; one is that it becomes tuberculous pus, and the other is that, as it is absorbed, organization takes place, and the pneumothorax cavity becomes gradually obliterated. On thoracoscopic examination, white strands of fibrin may be seen in the fluid. Many cases of pneumothorax which terminate by obliteration in this way do very well, a satisfactory fibrosis occurs in the diseased part of the lung, and the healthy part begins to function again. If, however, it is desired to maintain the pneumothorax the fluid should be aspirated from time to time, and if any signs of obliteration are found, the fluid should be completely removed and replaced by a 5 per cent. solution of gomenol in olive oil. Usually, after one or two aspirations, the fluid does not reappear.

Tuberculous purulent effusion.

The principles of treatment in a case of tuberculous empyema are:—

1. Remove the pus by aspiration, and not by open drainage. Wash out the pleural cavity with Dakin's solution in order to remove the fibrinous lining round the pleura and to encourage the lung to re-expand. If there is a bronchial fistula or perforation into the lung, as in a case of spontaneous pneumothorax, Dakin's solution is too irritating to use, and the pleura should be washed out gently with saline or methylene blue. When there is a large perforation, however, it is unusual for the lung to re-expand, and thoracoplasty becomes necessary.
2. If the lung fails to re-expand and to obliterate the pneumothorax or empyema cavity in spite of this treatment, some thoracoplastic operation should be performed to obliterate the cavity.
3. Attend to the general condition of the patient.

Pyogenic purulent effusion.

The principles in the treatment of pyogenic empyema are:—

1. Remove the pus, but always avoid an open pneumothorax.
2. Encourage the lung to re-expand and obliterate the empyema cavity. This should be done by washing out the cavity, and any drainage should be arranged so that air cannot enter from outside.

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3. Sterilize the cavity by frequent irrigations.
4. Attend to the general condition and nourishment of the patient.

Treatment of Anal Fissure by Injection of Quinine Urea Hydrochloride.

By CHRISTOPHER HOWARD, M.R.C.S. (Eng.).

(Abstracted from the *Lancet*, Vol. CCXX, April 25th, 1931, p. 914.)

Anal fissure constitutes one of the most tiresome and one of the most painful minor ailments to which human beings are liable, and any advance in its treatment must be met more than half-way and welcomed. Until recently the only treatment other than palliative measures—and they, admittedly, were usually futile—consisted in surgical interference. In the great majority of cases such interference, with the object of setting the ulcer at rest, met with undoubted success. There are still, however, great objections to this treatment, firstly that there is a small, but very real risk of some degree of permanent incontinence; and secondly that fairly deep general anæsthesia is required for the operation, and it has always seemed desirable that, wherever possible, a general anæsthetic should be avoided. No doubt the risk attached to the anæsthetic is minute, but there is a risk; and if we can substitute a method of treatment in which there is absolutely none, and which is undoubtedly efficacious, we are certainly justified in doing so.

An article dealing with this form of treatment was published last year in France. According to Dr. Bensaude and his co-workers, the method had been in their thoughts since 1921 and had been actually put into use nine years ago, but had been abandoned because of the painful reactions encountered. These reactions were doubtless due to the employment of solutions which were too strong, or to the use of too great quantities of solution, and the method therefore fell into disrepute. It was only revived in 1929.

Frank Yeomans, in his masterly work on proctology, says that in 1924 A. B. Graham reported the use of quinine urea hydrochloride in 30 cases, 27 of which were said to be cured. In 1926, at the American Proctological Society, Graham reported 128 further cases with complete relief except in 7 per cent., and Yeomans takes the view that it is possible to effect a cure in 77 per cent. of cases. The best results are obtained in acute cases, and this is only to be expected. Long-standing inflammation with surrounding induration and the deposition of much fibrous tissue mean a cutting-down of the local blood-supply and a diminished power of healing. But the fact that the method is definitely more successful when used in acute cases need not lead us unduly to condemn it, for when it becomes generally known that an acute fissure can be made to heal without operation, only a small proportion of sufferers will defer the treatment, and so in time a chronic anal fissure will become a proctological curiosity.

Technique.

The same solution is used as for injecting hæmorrhoids. I get Messrs. Parke Davis and Co. to put the solution up for me in ampoules, and this is perhaps the most satisfactory way, for it ensures its continued sterility. Moreover, it is all-important that it should be accurately and properly dispensed.

The patient should be examined and the necessary injection should be performed in the left lateral position. The French school recommend the genu-pectoral position, but as the vast majority of fissures are posterior the injection can be the more easily given with the patient lying on the left side. The patients are usually apprehensive owing to the acute pain which they have lately suffered. It cannot, therefore, be overstressed that absolute gentleness is essential. The gentleness in preliminary approach, in separating the buttocks, and in touching the affected area, must be complete. All the peri-anal skin should be gently swabbed with French tincture of iodine. It may be because of habit, but I believe that this French tincture is a better skin antiseptic, and if it does come into contact with mucous membrane it is less irritating than the English tincture. I use a 2 c.cm. syringe, because it is more convenient to hold than the smaller syringes, and a Number 17 gauge needle. Finer gauges can be obtained, but they are no less painful in use, are more liable to break, are more easily clogged, and have, as far as I know, no advantage over the 17 gauge.

The needle is inserted below the lower margin of the fissure, and one endeavours to choose a distance so that the body of the needle when running under the edge of the fissure does not cause any alteration in the outline of the fissure margin. The needle is gently pushed forward until the tip is estimated to be under the commencement of the fissure, and is then quickly pushed forward again, the plunger of the syringe being depressed at the same time, the ideal being to inject one minim of solution for each millimetre of forward progress of the needle. It is necessary to practise this beforehand, and a sufficiently accurate technique can be obtained with any form of soft leather, such as an old tobacco pouch or the leather lining of a hat. Few practitioners have any very great experience of intradermal injections and, owing to the contour of the peri-anal region, it is easy to place the injection too deeply in the subcutaneous tissue, with consequent pain and irritation and with no healing effect.

The actual injection will cause severe pain and therefore must be quickly performed. The severe pain lasts only a few seconds and then the local anæsthetic effect of the quinine urea hydrochloride begins to take effect and in a very few minutes all pain has gone. After the injection is made the fissure is swabbed with some antiseptic solution. Yeomans recommends a 20 per cent. ichthyol ointment, but Bensaude uses pure ichthyol. Personally, I find the most satisfactory solution to be the following: French tincture of iodine and compound tincture of benzoin 1 oz. each; with camphor, chloral hydrate, and phenol, ⅓ oz. each. This can be applied not only to the fissure but to the surrounding skin, and has a pleasantly soothing and antiseptic effect.

After the injection it is essential to explain to the patient the paramount need for a soft stool, and though there are plenty of alternatives on the market I do not think it is possible to obtain a better effect than that produced by taking a tablespoonful of liquid paraffin three times a day. It should be impressed upon the patient that this should only be used until the fissure has completely healed, and that the paraffin must then be permanently discontinued. If the patient, for reasons of taste or idiosyncrasy, is unable to take paraffin, normacol or psyllium seeds will provide an efficient substitute.

If the first injection is not successful another may be given three days later, and this again may be repeated in a further three days. The vast majority of fissures yield to the first treatment and so far, in my limited experience, no fissure has required more than three treatments, but it is conceivable that a very chronic fissure might need further treatment.

It should be realised by the operator that quinine urea hydrochloride is a caustic substance, and he must not let his zeal for cure outrun his discretion and allow this substance to *produce* fissures. I have no personal experience of such a happening and I have seen no report of one, but I imagine that it would not be difficult to provoke a very real and painful anal fissure by the indiscriminate injection of a caustic substance. The method will soon fall into disrepute if over-enthusiasm or over-dosage lead to over-injection.

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On the Use of Nasal Sprays and Drops.

By V. E. HENDERSON,
M. L. BEACH,
and
J. F. A. JOHNSTON.

(Abstracted from the *Canadian Medical Association Journal*, Vol. XXIV, No. 5, May 1931, p. 684.)

In many nasal infections, especially perhaps in the ordinary cold in the head, there is such a secretion of mucus and so much congestion that any nasal application has but small chance of reaching the inflamed surface. The exhibition of atropine, 1/150 of a grain, is usually sufficient to dry up the nasal secretion. Nor does this amount produce any serious disturbance, save in the very rare cases of idiosyncrasy to the drug. This is perhaps more common in young children. The heart rate will be decreased by 5 to 8 beats, or less, a minute, and no increase will occur. The mouth will be dry, but not uncomfortably so, in most persons. The membranes of the nose can now be reached by any medicament chosen. The congestion of the mucosa can be reduced by the use of an ephedrine spray or nasal drops.

Applications of medicaments to the nasal mucosa are usually made with an atomizer, such as the DeVilbiss, or by drops. The ordinary person places the bulbous end of such an atomizer in the nose, the atomizer being held horizontally, gives two or three vigorous blows, and is satisfied. Dependent on the size of the passages and the swelling and form of the turbinates, more or less of the lower meatus and of the anterior end of the middle meatus and lower turbinate is reached. This statement is based upon experiments in which liquid paraffin, with which lamp black had been thoroughly mixed, was used. The nose had been previously cocainized, so that the passages were larger than normal. The location of the blackening was then determined by the use of a nasopharyngoscope.

Subsequently, another method was employed. The subject inserted into his nostril an eye dropper containing about ½ c.c. of the oil and held the nostril, tilted his head well back, released the oil, removed the dropper and closed the nostril; then bent well down, holding the head as low as possible, and turned his head from side to side, gradually elevating it; then put his head again well back and bent it to both sides. In this way the whole nasal area that could be viewed with the nasopharyngoscope was covered. If this performance is repeated with a nebula such as No. 3 below, the distribution can be felt, and, if well done, no trace of the ingredients reaches the mouth, and no sensation of its presence comes from the nasopharynx. The black deposit appeared in the handkerchief for three to four hours.

The authors would respectfully urge upon physicians that their duty does not end with recommending the use of a spray or nasal drops, but that they should instruct the patient how these should be used. The spray should be directed horizontally and then upward and finally more upward till parallel with the nose profile, and, finally, without the bulb, into the orifice with the tip directed upward. But the authors would more strongly recommend the use of drops put into the nose and retained while the head is placed in various positions; down and from side to side, gradually upward from side to side, and finally backward and from side to side. Naturally, the method of rolling an instillation about can be applied to water solutions, and of these the authors would select argyrol, in 5 to 15 per cent. solutions.

A modification of this method is to lay the patient down with his head well back below the shoulder level (say, with the head over the end of a table). Insert the oil and roll the head about. There is little doubt that the oil glides over the surface and reaches spaces not easily reached by an ordinary spray.

The incorporation of the antiseptics, menthol, thymol and eucalyptol in an oily base undoubtedly decreases their antiseptic effect, but there seems good clinical evidence that such applications can do good. Whether this is due to the oil or to the other ingredients perhaps cannot be determined; but again there seems good reason to believe that the antiseptics have some effect.

The amount and type of antiseptic naturally varies with the preference of various physicians and the state of the membrane. It has been found by experiment that 4 grains of either thymol or menthol per ounce is definitely irritating to many persons, leading to very marked burning and pricking sensations, with a considerable production of mucus. This is hardly evident with the same strength of camphor. Eucalyptol in this strength is hardly noticed, but some persons appear to find eucalyptol irritant in almost any concentration. Even 10 grains of eucalyptol per ounce is found by many to be quite bland. Recently, there has been an increasing tendency on the part of the specialist to employ lower concentrations of these antiseptics. For young children, menthol and thymol would be either omitted or used in ½ gr. or 1 gr. per ounce; eucalyptol 3 to 5 grains per ounce only. For adults, thymol and menthol (2 to 3 grains per ounce), eucalyptol (3 to 10 minims), and camphor (4 to 5 grains) seem to be the favourite concentrations.

In regard to oil of pine, the official oil is Oleum Abietis, Oil of Siberian Fir or Oil of Pine, but this is not usually dispensed, Oil of Pinus Sylvestris being used instead.

As a simple oil nebula for a child, the following may be tried:—

℞	Eucalyptol	..	min. v.
	Paraffini Liquidi	..	ad ℥i.

For adults, the following:—

℞	Thymol	..	....
	Menthol	.. āā ..	gr. ii.
	Eucalyptol	..	min. iii.
	Paraffini Liquidi	..	ad ℥i.
℞	Menthol	..	gr. iii.
	Camphor	..	gr. iv.
	Eucalyptol	..	min. iii.
	Paraffini Liquidi	..	ad ℥i.

For the eucalyptol, Oil of Rose or Oleum Abietis may be substituted.

Psychoanalysis and Medicine.

By FRANZ ALEXANDER, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. XCVI, No. 17, April 25th, 1931, p. 1351.)

Psychoanalysis as a therapeutic method.

The importance of the therapeutic situation which, except for the didactic analysis, is the only suitable condition for detailed psychologic research, is responsible for a unique feature of this new discipline. I mean the coincidence of therapy and research. In psychoanalysis the research takes place during the treatment, or, in other words, the ends of the treatment and research coincide.

After Freud had learned that neurotic symptoms are dynamic manifestations of repressed mental tendencies which the patient excludes from his consciousness and which return into consciousness in a disguised form, in the form of unintelligible symptoms, he realized that the way to free the patient from his symptoms was to make conscious the underlying repressed tendencies. In this way psychoanalysis extends the field of activity of the conscious ego over such portions of the personality as are unconscious before the treatment. The patient, especially as a result of the emotional experiences of the analyses, becomes more conscious of himself and becomes able to control a greater part of his mental forces than he could before. He becomes able to master also those forces which were bound up in the neurotic symptoms and to use them for normal activities. This is the way of his healing. And so the aim of therapy and research is the same, a more complete knowledge of the personality. This is indeed

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a unique fact in the field of medicine. In all other forms of medical treatment the patient plays a passive rôle. It is not only not necessary to initiate the patient into the details and mechanisms of his disease, but it would be in most cases disadvantageous to do so. In the case of psychoanalysis, however, the patient's knowledge of the repressed mental contents responsible for the symptom formation evinced itself as *the* therapeutic agent. This lucky coincidence of a method of therapy with the method of scientific research is responsible for the unique fact in medicine that therapy is not only one approach to scientific knowledge but the very source of it.

The psychoanalytic technic which I have lauded as the great methodological invention which made of the research of personality a science, and of psychotherapy an etiologic treatment, may appear too simple and trivial to be hailed as responsible for the development of a new science. Some may object: What is the great new thing which psychoanalysis does? It takes suitable objects of investigation who are willing to give an insight into their personalities and gives them the simple technical instructions to give up conscious control of their trains of association. I agree that the method is really simple, as every scientific method is. The secret of its efficiency is only that it is adjusted exactly to the nature of the subject-matter of the investigation. The whole development of scientific medicine in the modern age is also due to the simple device, instead of speculating about the human body, to look at it, to dissect it and to investigate all the details of its construction. The psychoanalyst listens in the same way as the anatomist looks. And this analogy goes really deeper than it may seem. The preanatomic medicine consisted also in vague generalizations and speculative concepts similar to those of the pre-Freudian psychology. Psychologists spoke about emotions, about will, ideas, perceptions and apperceptions, but they were not interested in the actual and detailed mental content. The introduction of dissection was not a smooth and easy process. It encountered all the emotional prejudices of the contemporary mind just as the dissection of the personality has aroused all the emotional prejudices of our day. If one reads the writings of some critics of Freud in Germany and replaces the word "personality" or "mind" with the word "body," one has the same arguments that were set forth against the dissection of the body in the sixteenth and seventeenth centuries. Psychoanalysis is a sacrilege, it degrades the mind, it drags down into the mud our highest mental possessions. Do you not recognize in these sentences the style of the critics of dissection of the body? Anatomy and physiology no doubt brought about a great disillusion: scientists did not find any place for the spirit. And psychoanalysis also brought about a disillusion. The dissection of the mind reduces the whole complexity of the personality with all of our highest strivings and intimate vibrations to a system of dynamic forces which under sober scientific aspect lose all connotations such as good and evil, high and low, beautiful and hideous. All these evaluations eliminated from the field of science naturally retain their significance in practical life.

I would give a false impression if I stressed only the simplicity of the psychoanalytic method. It is simple only in its general principles; that is, in the principle that one has to listen to what the patient says. The scientific evaluation of the material that is obtained is, however, by no means simple. An elaborate technic of interpretation based on long and painstaking comparisons makes the learning of this method just as difficult as the learning of the use of the microscope. It requires long experience and training of the complex faculty of understanding the mental situations in others. Training in the method of interpretation itself can be compared with the learning of a new language. Dreaming and all the manifestations of the unconscious mind speak a different language from that of the conscious mind. It is a kind of language in pictures and its relation to conscious thinking is similar to the relations of ancient picture writing to modern writing with letters.

Conclusion.

I see the significance of psychoanalysis in its relation to medicine in the following two accomplishments: 1. With the help of a technic specifically adapted to the nature of psychic phenomena it developed a consistent and empirically-founded theory of the personality suitable to serve as a basis for the understanding and treatment of mental disturbances. 2. It gave a concrete content to the philosophic postulate which considers living beings as psychobiologic entities by investigating in detail the interrelation of physiologic and psychologic processes. The greater part of these investigations must, however, be left to the future to be accomplished.

I must confess that I feel my presentation incomplete because I have touched only the actual results of psychoanalytic investigation and focused my interest on the method. But I think that it is more interesting and important for physicians to hear about the scientific nature and methodology of psychoanalysis if they desire to become oriented toward this young science so widely challenged, so problematic, and still so unknown. If the reader has obtained the impression that the method itself is sound, it is of secondary importance whether the results are finally tested or not. If the method is sound in time the results must also become sound and acceptable. Let me conclude with a sentence which seems best to characterize the importance of Freud's life work:

Talleyrand said once that language is the best means to hide our thoughts, a truth which only a diplomat could have found. Freud's accomplishment is that he created a method by which language is no longer useful only for hiding our thoughts but is also good for investigating them.

Vitamins and Digestibility of Food.

(Abstracted from the *Journal of the American Medical Association,* Vol. XCVI, No. 18, 2nd May, 1931, p. 1507.)

To-day, twenty-five years after the inception of the vitamin hypothesis, this conception is firmly established as a principle of nutrition; in natural foods there are certain as yet unidentified substances without which nutritive failure results. These food factors have been classified according to the symptoms and structural changes appearing in experimental animals given diets lacking the appropriate vitamin. Ocular changes, renal calculi and metaplasia of epithelial cells occur in the absence of vitamin A; polyneuritis and anorexia characterize a deficiency of vitamin B; a weakening of the endothelium of capillaries seems to be the fundamental change brought about by a lack of vitamin C; defective utilization of calcium and phosphorus results when vitamin D is absent, and without vitamin G there occurs a more or less characteristic dermatitis. In experimental animals subjected to a deficiency of any of the recognized accessory food factors, cessation of growth occurs. These reproducible observations serve as indexes of disturbed body functions but thus far few data are available bearing on the precise mode of action of the vitamins. In a recent investigation, St. Julian and Heller have examined the digestibility of fats, carbohydrates and proteins in experimental animals subjected to the appropriate vitamin deficiency. The animals were given the incomplete food until the store of vitamins was depleted; the missing factor was then given to part of the animals, which thus served as controls. Studies in metabolism were then made. No difference in the digestibility of fat, carbohydrate and protein was demonstrated between the groups given the complete ration and those in which the diets lacked vitamins A, B, C, D or G. In spite of the functional disturbances and structural alterations in the various

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deficiencies produced, the mechanical and chemical factors in digestion apparently proceeded normally. In view of the frequency with which the gastro-intestinal tract is the seat of obvious disturbance in vitamin deficiencies, this result is surprising. The conclusion seems warranted that the primary locus of action of the accessory food factors lies in those cells more strictly responsible for the major portion of the metabolism of the body.

Otitis Media: Its Management and Treatment.

By E. CLYDE HARNER.

(Abstracted from the *International Medical Digest*, Vol. XVIII, No. 5, May 1931, p. 269.)

Early incision of the membrana tympani is essential; there are far more deaf people to-day from delay in *opening of the membrane* than from unnecessary opening of the same. When there is redness and fullness in the region of Shrapnell's membrane, fever (though mild), pain, and lessened hearing, the drum should be incised, even though there is still a cone of light and the handle of the malleus can be seen. This is, of course, in the acute suppurative or serous otitis. An exception is made in the acute catarrhal otitis (acute exudative catarrh), where there is a fluid level showing through the drum and containing bubbles of air, with little or no fever and no symptoms except a "stuffy feeling." These are best treated by mild inflation.

The widespread use of phenolized glycerin should be limited to the relief of pain and the very early treatment of the mild, beginning congestions of the drum and the middle ear. It is true that these conditions can be cleared up many times by the use of warm phenolized glycerin, especially if used in conjunction with treatment of the nose and nasopharynx, and with general measures, such as rest in bed, increased elimination, etc. When one thinks of the anatomical structure of these parts, it does not seem that any real inflammation of the middle-ear cavity and Eustachian tube can be appreciably affected by an instillation of this mixture against the imperforate drum. Further, when the drum has been opened and large amounts of thick purulent secretion are trying to escape from a small opening, it does not seem the part of good judgment to obstruct the very necessary exit by a thick substance such as glycerin. Its hygroscopic power is nullified by its inability to reach the affected tissues. For this reason, an aqueous or spirituous solution should be used.

A light gas-oxygen anæsthesia, whenever available, is the preferable one, although fairly satisfactory local anæsthesia can be obtained in most instances by using the so-called triple mixture, consisting of equal parts of cocaine, menthol and phenol. However, in markedly congested ears this will not give complete anæsthesia, even though allowed to remain against the drum for 30 minutes, and the pain from the pressure of the cotton containing the mixture when first applied is sometimes as severe as would be the incision.

The author favours the irrigation method of treatment. When the toxic, irritating, secretions are allowed to remain within the canal, they further inflame and lower the resistance of the integument of the drum and also the canal wall, and by their very nature increase swelling and further obstruction of drainage from the middle ear. Soda solution is preferable to boric acid because of its detergent effect and its ability to neutralize the acidity of the discharge. A small, soft, rubber ear syringe is preferable to other types of irrigators in home practice. There comes a time toward the end of the process, when the discharge has become more mucoid, that irrigations should be decreased or stopped altogether. A little later when even this type of discharge has given way to just a thin secretion and the drum head is receding to normal, a simple dry cotton tampon, changed as often as necessary, seems to hasten resolution; but during the acute stage the ears should be irrigated every two hours during the daytime and once or twice at night.

The treatment of the throat and nasopharynx is of almost as much importance as the treatment of the ear itself. Particularly is this true in the case of infectious diseases, including influenza, measles, scarlet fever, etc., and also in the presence of large masses of infected adenoid tissue in the vault of the nasopharynx. The author uses one of the colloidal silver salts, or an aqueous antiseptic of the nature of Metaphen. Oily "drops" should seldom be used in infants' noses. A recent investigator has proved that most of these substances find their way into the lungs of the child and their effect is most deleterious, since oil globules are not absorbed to any extent from the alveoli of the lungs. In addition to this, the nasal mucosa of both infants and adults resents overmentholizing and camphorizing. It is often wise to do an adenoidectomy upon small children, even in the face of considerable fever, where there is a very large mass of adenoids around the mouths of the Eustachian tubes which will not shrink up with local treatments and are holding infectious material against the orifices of the tubes, as would a sponge.

The author considers diathermy, zinc ionization, vaccine therapy and leukocytic extract as meritorious in treating otitis media.

Reviews.

SURGICAL EMERGENCIES IN PRACTICE.—By W. H. C. Romanis, M.A., M.B., M.Ch. (Cantab.), F.R.C.S. (Eng.), F.R.S. (Edin.), and P. H. Mitchiner, M.D., M.S. (Lond.), F.R.C.S. (Eng.). London: J. & A. Churchill, 1931. Pp. vii plus 608, with 158 illustrations. Price, 18s. net.

This book is intended for the practitioner who wishes to look up the main points about an emergent condition without having to wade through the details of pathology and alternative methods of treatment which necessarily add to the length of the articles in the standard text-books of surgery. The authors have, therefore, abridged their well-known *Science and Practice of Surgery* by selecting the sections on conditions which require active treatment within forty-eight hours (not necessarily operative treatment), cutting out all the pathology, and giving the clinical signs, differential diagnosis and those methods of treatment which they believe to be the best. It is of course very difficult to decide what to include in and what to leave out of such a book; most of us would hardly consider senile gangrene to be a condition of such urgency; nor are cerebral and cerebellar abscesses the sort of cases to be undertaken by the comparatively inexperienced, a point which is modestly hinted at in the text. Some useful hints on improvisation of operation necessities have been added and here and there one noticed small changes, but for the most part the articles are abridgments of those in the larger book, and to those who know this work it is unnecessary to say that the result is a concise but sound guide to practice. Especially to be commended are the long section on infections of the hand, in which Kanavel's work is embodied, the chapters on the treatment of fractures and dislocations, which are on the most modern lines and include references to Steinman's pins and Kerschner's piano wire, and the section on acute appendicitis and the advice to deal with cases of over forty-eight hours duration by the Ochsner method, though there is no reference to the great value of anti-gas-gangrene serum in these cases. The section on the treatment of acute retention of urine needs revision by a urologist, for it would be difficult to find one who would agree with the advice to use metal catheters in this condition; there are many better and less dangerous instruments available. On the whole this book can be recommended to practitioners requiring a sound guide to urgent surgery within a small

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compass. As is to be expected from Messrs. Churchill the printing and binding are all that could be desired.

W. L. H.

INTERNATIONAL CLINICS. A QUARTERLY. VOL. I, 41ST SERIES, 1931.—Edited by Henry W. Cattell, A.M., M.D., Philadelphia and London: J. B. Lippincott Company. 1931. Pp. viii plus 307. Illustrated. Price, Rs. 9-6. Obtainable from Butterworth and Co. (India), Ltd., Calcutta.

This number is made up of a collection of papers on selected subjects covering all branches of medical science, including records of unusual cases and of new or special lines of treatment.

Opening with two clinical lectures there follows a biochemical section containing a comprehensive and useful article on the present knowledge of carbohydrate metabolism, normal and abnormal.

The second half of the volume is devoted to "Remarks on recent progress and important developments in medicine, obstetrics, pediatrics and surgery." The vast list of references attached to this is testimony to the wide field of current literature and opinion that has been drained for its construction. In the medical section there is to be found among other matters an outline of the treatment of pneumonia by carbon dioxide and oxygen inhalations, some discussion on quinidine and digitalis therapy, and lipoid nephrosis. It is interesting to see revived the view, held twenty-five years ago, that the administration of iron in pernicious anæmia is irrational.

In the section on obstetrics and pediatrics the use of various recently-introduced forms of anæsthetics, including Avertin, is discussed, but it appears that the ideal anæsthetic in labour is yet to be found.

With regard to the use of irradiated ergosterol in the prevention and treatment of rickets, the importance of standardised preparations is emphasised both as ensuring adequate dosage and preventing overdose.

The volume is neatly bound and contains a number of illustrations.

E. H. V. H.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY.—By H. Bailey, F.R.C.S. (Eng.). 3rd Edition. Bristol: John Wright and Sons Ltd. 1931. Pp. xx plus 277 with 318 illustrations. Price, 21s. net. Postage, 9d.

It is with great pleasure that we welcome the third edition of Mr. Hamilton Bailey's useful little book on physical signs in surgery.

It could really be called the fourth edition, as the first edition was printed in August 1927, and a second impression with some alterations was issued in October 1928. Then the second edition proper made its appearance in January 1930, and the present one in June of this year. The fact that it has gone through four impressions in four years is proof positive of its worth.

All the common physical signs which are met with in surgery are enumerated, carefully described, and in many cases amply illustrated, and the same is true of many lesser known signs. Some of the latter are indeed so unfamiliar as to be almost obscure. To mention one; a sign of acute pancreatitis called Johnston's sign is described. This is a yellow discoloration for about 1½ inches around the umbilicus, and has been noticed by one observer (L. B. Johnston) in one case only. We are of opinion that a sign of such extreme rarity hardly merits recording.

Mr. Hamilton Bailey carefully points out the right from the wrong way of eliciting many of the common signs, and warns the reader against too hasty a diagnosis. For instance, "every case of flattening of the shoulder is not a fracture or dislocation around the head or neck of the humerus. The flattening may be caused by atrophy of the deltoid due to paralysis of the circumflex nerve."

When describing the signs and causes of acute retention of urine in the male the author recalls to the reader's memory the "Seven Ages of Man" from "As You Like It," and applies these seven ages to the causes of acute retention as follows:—

"The Infant" has acute retention due to phimosis or atresia meati.

"The Schoolboy" has retention from a stone in the bladder.

"The Lover sighing like a furnace" probably has retention caused by acute urethritis.

"The Soldier full of strange oaths" has almost certainly a urethral stricture.

"The Justice" is probably a case of enlarged prostate.

"The Sixth Age" is a case of retention due to cystitis, and

"The last scene of all" is atony of the bladder.

Mr. Hamilton Bailey is to be congratulated on the ingenuity of this simile, but we are of opinion that he has rather maligned the people of Shakespeare's day, especially the Lover and the Soldier, and we would like to think that there were other causes for their distress than those attributed to them.

The book is nicely got up, well printed, and contains several useful coloured plates amongst the illustrations.

H. E. M.

ABDOMINAL PAIN.—By John Morley, Ch.M., F.R.C.S. 1931. Edinburgh: E. & S. Livingstone. Pp. 191 plus xv, with 21 figures. Price, Rs. 7-14. Obtainable from Butterworth and Co. (India), Ltd., Calcutta.

The author has been stimulated to write this little book by a growing conviction, based on extensive clinical observations, that much of the current teaching on the nature and mode of production of abdominal pain is confusing to the student, valueless to the practitioner, and physiologically unsound.

Our views on abdominal pain have been very largely formed and moulded by the investigations of that great research worker the late Sir James Mackenzie to whom Mr. Morley, although unable to accept his conclusions, pays a well-deserved tribute. Mackenzie doubted the existence of true visceral (or splanchnic) pain; he explained visceral pain as due to a system of reflexes through the splanchnic afferent nerves to the cerebro-spinal nerves of the abdominal wall; his views are admirably summarised by Mr. Morley. "He (Mackenzie) postulated first a *viscero-sensory reflex*, by which painful stimuli from a viscus passed up through the splanchnic afferent fibres to the spinal cord, there set up by radiation an irritable focus, and so, by lowering the threshold, produced cutaneous hyperalgesia in the skin of the abdominal wall supplied by the cerebro-spinal sensory nerves that entered the affected segments of the cord. Likewise he postulated a *viscero-motor reflex*, whereby strong afferent stimulation through the splanchnic afferent nerves, spreading to the anterior horn cells, caused a reflex tonic contraction of the muscles of the abdominal wall that received their nerve supply from the same spinal segments." For Mr. Morley, on the other hand,....., "the phenomena of deep and superficial tenderness and muscular rigidity of the abdominal wall, so commonly observed in association with inflammatory disorders in the abdomen, are in no way concerned with the afferent autonomic system, but are entirely referred from the highly sensitive cerebro-spinal nerves of the parietal peritoneum." He also differs from Mackenzie in his belief in the existence of true splanchnic, or visceral, pain, *i.e.*, pain due to the stimulation of afferent splanchnic nerves. This pain is deep-seated; it has a dull, heavy character and is imperfectly localised; developmentally it is probably a more primitive form of pain response than that due to stimulation of the afferent somatic nerves.

Mr. Morley develops his thesis in a series of admirably lucid chapters including such important subjects as pain in disorders of the stomach, duodenum, and biliary system, the mechanism of pain in acute appendicitis, and pain in the urogenital system.

Although this book is written by a surgeon, and although it will probably make its chief appeal to the

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author's fellow artists, we are convinced that its study will guide (and perhaps comfort) every practitioner of medicine who is sufficiently in love with his art to be distressed at the frequency with which he is completely baffled by the origin of that very common complaint "a pain in the belly."

Printing and binding are excellent, and the price is eminently reasonable.

J. M. H.

THE THEORY OF OBSTETRICS.—By M. C. de Garis, M.D. London: Baillière, Tindall and Cox. 1930. Pp. 272. Price, 12s. 6d. net.

This is a difficult book to review for the author repeats himself so frequently; it seems possible that he could have boiled down his theory and conclusions to a very large extent. From the preface and title page it is difficult to tell whether he is a philosopher, a clinician or a professor of the art of obstetrics; judging by his circumambulatory methods I think he must be the first-mentioned. There is, however, much that is interesting to a professor, for it is comforting to the West and the East to find that there is no superiority complex about Australian obstetrics, and this in a country, semi-rural and blessed with eternal sunshine.

Dr. Garis is an advocate of painless labour, which should occur if the diet from youth to adolescence were like that of David's entertainment in the second book of Samuel (Chapter XVII, verse 28), *viz.*, "wheat barley and meal, parched corn, beans, lentils, and olives, honey and butter and sheep and cheese of kine." I am sure he is right but these also are not the days of Solomon with its "fatted fowl and fatted oxen" for either hospital or private patients. The doctor proposes, the patient disposes. The author is, however, on a far better wicket when he stresses the effects of septic foci in teeth, gut and kidney, as causes of much faulty child-bearing. This is a book for the dilettante rather than for the student.

V. B. G-A.

MODERN INFANT FEEDING.—By Bernard Myers, C.M.G., M.D., M.R.C.P. London: Jonathan Cape. 1930. Pp. 160. Price, 5s. net. Obtainable from Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 3-12.

This, together with Donald Patterson's new book on the same subject, is in my opinion the very best value for money that the general practitioner can buy. Bernard Myers is a well-known London post-graduate lecturer, and has spent many years on the staff of the Waterloo Hospital for Children in order to give us the benefit of his findings. To my mind the most interesting chapter is that on physiological points, for once the post-graduate student understands infantile physiology, the arts of feeding and treatment become easy. This little book is worth a gold-mine to the young practitioner.

V. B. G-A.

BIO-ASSAYS: A HANDBOOK OF QUANTITATIVE PHARMACOLOGY.—By J. C. Munch. London: Baillière, Tindall and Cox. 1931. Pp. x plus 958, with 6 plates and 17 figures in the text. Price, 45s. net.

With the growth of the science of medicine, new and complex remedies are being daily added to the armamentarium of the physician and it is becoming increasingly necessary for medico-legal and control purposes to assess the individual merits of these remedies. Many of these drugs, *e.g.*, sera, toxins, vitamins and gland products, do not admit of the ordinary chemical methods of standardization and hence recourse must be had to physiological methods of evaluation upon living animals and tissues. The treatise on "Bio-assays" by Dr. James C. Munch is, therefore, likely to have the warm support of all investigators in this field of pharmacology.

It is a book of nearly one thousand pages, replete with all the necessary information pertaining to the subject. As a work of compilation from the published literature on this subject it perhaps stands unique. The chapter on drugs acting on the circulation, particularly the section on digitalis, is worth special mention. Though the author has shown a distinct inclination in favour of the frog method of assaying digitalis, the other accepted methods have not been scantily dismissed. Full justice has not been done to the standardization of sera and vitamins, though much has already been written and several methods of assay have already been evolved. The estimation of sera is passed over in six pages and only twenty pages have been accorded to the vitamins. The practical details and difficulties of biological assays have not been fully dealt with and more attention seems to have been paid to the statistical data and tabular representations of figures, with the result that the interest of the reader flags.

The special feature of the book is the rich bibliography appended at the end of each chapter. Though voluminous, its value will be immensely appreciated by all research workers. The labour involved in the tedious process of consulting, abstracting and tabulating these references must have been gigantic and the author is to be congratulated on the way it has been accomplished.

R. N. C.

WELFARE PROBLEMS IN RURAL INDIA.—By A. P. Pillay, O.B.E., M.B., B.S. Bombay: D. B. Taraporevala Sons and Co. 1931. Pp. xxi plus 187. Illustrated. Price, Rs. 8.

Captain Pillay is the joint author of *Maternity and Child Welfare*, a book which was received very favourably in 1928. In his present book Captain Pillay enlarges the scope of his subject and treats of rural welfare in India in its wider aspects, social, economic, educational, medical relief, and health. One constantly hears in Bengal the taunt that well-to-do people desert their villages and come to the city. Is this a just aspersion? May not the salvation of a malaria-stricken countryside lie in the aggregation of population, the pooling of resources for the common good? Improvement of public health in England went hand in hand with urbanization, though to start with terrible mistakes were made in the new towns. It is unlikely, however, that urbanization in India will occur deliberately, and though water supplies may be comparatively good, conditions of housing and refuse disposal in Indian towns are often little better, or are distinctly worse, than they are in villages. Village uplift and improvement present many difficult problems and these are partly faced in this book. In the first two chapters the author presents the problems which are peculiar to India—its enormous area, its diversity of races, the caste system, early marriage, religious fatalism, and the status of women. The problem of population growth is shortly discussed in a general manner. Then follows an informative chapter on rural administration by Mr. Dikshit, Collector of Sholapur, and a similar chapter by Dr. Subramanyam outlines succinctly the public health organisation in British India.

Part II gets down to the real problem, that of maternity and child welfare. Unless the human race starts properly in infancy, the adults can never be of the best. Hence the possible fallacy of the "survival of the fittest" theory which one so constantly hears from conscientious objectors to such welfare work. Nature does not always spare the fittest by any means. It is very often the best mothers and the best infants that die, and famine and malaria do not confine their attentions to weaklings only. Welfare work in England and America is described and especially interesting is the description of work in the villages of the Punjab by Mrs. Mitra, Inspectress of Health Centres, Lahore. The Sholapur District Scheme is similarly a serious attempt to get down to improving the midwifery in the district by training the local *dais*, by keeping them up to date by supervision, and by forming maternity homes.

Part III deals with the larger aspects of rural reconstruction. A chapter on "A practical scheme of rural reconstruction" by Mr. F. L. Brayne, I.C.S., will

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be read with great interest by all practically-minded people. Mr. Brayne's work in Gurgaon is well known. The benefit and utility of cleanliness is one of his watchwards, and village pits are the practical outcome; these pits are for the deposition of all excretal and waste matters, and their utilisation later as manure. Mr. Brayne describes his methods for brightening village life, educating women out of drudgery, and removing the apathy and ignorance which bind down human lives in villages to monotony, drudgery, and indifference. Equally interesting is the chapter on rural construction in south India by Mr. L. A. Hogg in which the manifold activities of Y. M. C. A. works in southern India are set forth with an infectious enthusiasm. Plans for co-operative work in poultry breeding, bee keeping, cattle breeding, and weaving are described together with activities in education, industrial schools, and village libraries.

Captain Pillay closes with some chapters on rural welfare work in India generally and outlines methods of work—all must aid government agencies, local governing bodies, voluntary agencies, and the people themselves. The public health department should be reorganised so as to take a more vigorous action in the matter, and there should be a full-time director of child welfare; workers—doctors, nurses and midwives—should be trained more fully in welfare methods; and local bodies especially should regard welfare work as one of their main duties.

Various appendices contain useful statistical information, and various syllabi of training for health workers.

The book is a useful guide to welfare work in India and is in parts distinctly inspiring. We recommend it to the notice of all interested in the welfare of rural India.

"INTRAVENOUS THERAPY."—By K. V. Thakkar, L.M. & S. (Bombay University). Foreword by Major-General A. Hooton, C.I.E., I.M.S. (Retd.). Pp. lv plus 194. Illustrated. Calcutta: Butterworth & Co. (India), Ltd., 1931. Price, Rs. 5.

This useful little handbook has been published as a guide to those who wish to practise intravenous therapy, but who, for one reason or another, avoid it as a dangerous form of medication. It contains full detailed information about the method of intravenous administration and includes detailed formulæ and instructions. Amongst other points of value it gives a description of the technique of blood transfusion. The book is divided into ten chapters and contains several useful tips on intravenous therapy. It is also well illustrated. As the author says in the preface, the book is compiled from various publications and journals, and it should prove very useful for senior students and junior practitioners.

S. S. R.

THE HISTORY OF MEDICINE: A SHORT SYNOPSIS.—By B. Dawson, M.D. (Lond.), F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1931. Pp. xiv plus 160, with 31 illustrations. Price, 7s. 6d. net.

We can imagine the excessively practical—and short-sighted—student complaining that he does not see how a most minute knowledge of the lives of Hippocrates or Galen is going to help him to prescribe the correct treatment in a case of pneumonia or to recognise an acute abdomen. But he is wrong, and, fortunately, if we are to accept the statement of the writer of the foreword in the book under review, he is in the minority amongst medical students of the present day. History is not all "bunk," as Mr. Ford has said, whatever the exact meaning of the word may be. To obtain a proper understanding of any science we must know something of its genesis. It is surprising in these practical times when curricula are overcrowded and all the "Mr. Fords" are urging teachers "to cut the cackle and get to the 'osses" that in medical schools more and more attention is being paid to the subject of the history of medicine. There must not, however, be any misunderstanding in this matter; interest, appreciation and even enthusiasm about the work and teachings of the ancient Greeks does not mean that we should revert to their practices, or even to their principles except in the very widest sense. In India there is at present little chance of the practices of the ancient Hindus being forgotten; the natural enthusiasm for their teachings has regrettably led certain sections of the community to urge systematised reversion to their practices.

Most histories of medicine are disappointing; they seem to degenerate into mere biographical dictionaries. This is not suitable for the student. The concise synopsis which the author of the book under review has given is all that the student needs. The book is nicely balanced and the author has not devoted an undue proportion to the post-Sydenham period, a mistake which so many medical historians seem to make. The evolution of such special subjects as radiology is such a recent event that the student learns it automatically when he is receiving instruction in this subject. The book does, of course, mention the influences of such outstanding moderns as Pasteur, Koch, and Lister.

The student of Hindu medicine may be somewhat disappointed that no mention is made of the part it has played in the evolution of modern medical science.

It is an excellent and most readable little book. The format is of a high standard.

L. E. N.

(1) IN EXILE.—By Sir Ronald Ross, K.C.B., K.C.M.G., F.R.S., N.L. London: Harrison and Sons Ltd., 1931. Pp. 80. Price, 10s. 6d. net.

(2) LYRA MODULATA.—By Sir Ronald Ross, K.C.B., K.C.M.G., F.R.S., N.L. London: Harrison and Sons, Ltd., 1931. Pp. 21. Price, 10s. 6d. net.

Two slender volumes have recently been received for review; one is a reprint of verse written by Sir Ronald Ross many years ago, and the other a collection of verses which he has rewritten for this edition. Each volume contains a new preface. The reviewer is compelled to admit that the preface of *Lyra Modulata* is beyond his range of appreciation and that he does not grasp the subtlety of the poet's "musaic spelling." The preface of *In Exile* though newly-written contains little new matter. It gives a somewhat incoherent account of the indifference shown by the world in general, and the English-speaking races in particular, to all scientists, and the cruel neglect that has been the fate of at least one poet—an old, old story.

Of all people in the history of the world who have failed to receive the honour due to them in their own country and have been despitefully used in other lands, surely Sir Ronald heads the list. With shame we admit the probable truth of *his* suggestion that our failure to appreciate his verse is "due to some national defect of intelligence among the English-speaking population," and it was presumably the national dishonesty of the Italians which led the "brigands" in Rome to attempt to filch the laurels of his scientific labours.

The reviewer does not feel entirely competent to judge of the quality of the verse (it was perhaps a mistake that the books were ever sent to him!) He is, for example, uncertain whether or not the following stanza exhibits good meter,

"We hoped for rain because
After thunder rain is given;
And yet it only was
The mockery of heaven"

but the line "And thou, O Heart, art husht" appeals to him as an exercise in aspirates, a change from "Has Herbert hit Horace intentionally."

Fortunately, Sir Ronald foresaw the possibility that his books would fall into the hands of an unintelligent reviewer and he has provided at the end of *In Exile* some unsolicited testimonials from a number of persons who do not exhibit the "national defect." A member of

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the London County Council writes, "The concentrated passion of some of the quatrains seems to be *unmatched*....." and surely a member of the London County Council ought to know! And when the Poet Laureate writes, "I know nothing like it" and "we read *In Exile* continually, with increasing admiration, it is the only poem I have ever read which kept me awake half the night," it is obviously quite unnecessary for a mere physician to presume an opinion.

Sir Ronald has not been well served by his printers, or was the proof reading at fault? Anyway, an errata slip of six items in a book of xii + 80 sparsely-printed pages is not a good record, especially at the price of half a guinea.

HANDBOOK OF PROTOZOOLOGY.—By R. R. Kudo, D.Sc. London: Baillière, Tindall and Cox, 1931. Pp. 451 with 175 figures in the text. Price, 25s. net.

This book is not intended for the ordinary medical student, but it is one that the student who intends to make a special study of protozoology will find invaluable. As the author in his preface remarks, most writers on the subject are liable to emphasise the parasitic forms at the expense of the free-living protozoa, consequently the pure-zoology student acquires a distorted view of the subject. This author has endeavoured to give without fear or favour a classification which includes all parasitic and free-living forms, and to discuss biology, development, and orientation with reference to representative genera from each group. Even for the medical protozoologist a true picture of the relationship of the non-parasitic to the parasitic forms is important; there is no doubt as to their common origin and it is important for obtaining a proper appreciation of the parasitic species to know something of the biology of the allied free-living species.

The book can be divided into three parts; the first consists of three short—too short in our opinion—chapters on the morphology, physiology, and reproduction of protozoa in general; the second consists of one chapter only in which a skeleton classification is given—this is very helpful; and in the third part the taxonomy, biology and development of the common protozoa—Order by Order—are discussed.

The general arrangement is good and the text is well illustrated. The lecture-notes style of writing has been adopted; this is possibly quite justifiable in a book of this kind, but it is none the less irritating, and often quite unnecessary. Surely it is as easy to write "The endoplasm has numerous small vacuoles," as "Endoplasm with numerous small vacuoles."

The type is clear, the paper good, and the book artistically and suitably bound.

Annual Reports.

RÉSUMÉ OF LIEUT.-COL. J. MORISON'S REPORT OF THE MAKAWLAM ENQUIRY COMMITTEE, 1927.

Our first step as a Committee was to review evidence placed before us by the Secretary to Government, Department of Education, and by the Director of Public Health.

Evidence before the Committee.

Makawlam, one of the mystery diseases of Burma, is, as will be seen, of even more interest to the psychologist than to the pathologist. The name is Shan. It means "the spot (or fruit) gets ripe" and refers to an eruption of spots or pimples at the margin of, or just within, the anus. This eruption is invariably associated with the fever, more or less severe, which characterises the disease.

How the name originated and where it came from we do not know: nor have we, with the material before us, much ground for conjecture. The name seems to have come into currency about ten years ago. Dr. Henderson of the American Baptist Mission, Taunggyi, first heard the name from eight to ten years ago, he thinks, at Yawnghwe. *Say Saya* Sayayon who has been in practice in Yawnghwe for thirty years first heard the name ten years ago.

Forty miles north of the Heho-Taunggyi road at Lawksawk we were informed by the senior *say saya* that *makawlam* had appeared there for the first time about ten years ago.

At Yawnghwe the name was first heard from *say sayas* who came from Keng-Tung. Mr. Cameron, Assistant Superintendent, Southern Shan States, was told by natives that the disease started in China beyond Keng-Tung and spread westwards.

On the other hand the Shan *say sayas* of Loimwe on the eastern frontier of the Southern Shan States have neither seen nor heard of a case and are wholly ignorant of the name.

We understand that *makawlam* is pure Shan. One *say saya* at Lawksawk said the same disease was known in Mandalay as *Usauna*. Another Burmese synonym is *pin-le-u-chauk*. There are various spellings of the word *makawlam* which seems to get corrupted when used by Burmans. We have adopted what we understand to be a close rendering of the Shan name. The name may be compounded to distinguish a special variety, *e.g., plague makawlam.*

In the Triennial Report on the Hospitals and Dispensaries for 1917–19 Colonel Entrican, C.I.E., I.M.S., reported *makawlam* "to be very prevalent in some parts of the Southern Shan States, causing heavy mortality." He mentions it with other "rarer and sometimes wholly unrecognised morbid conditions—*athama, pengoo na, hton yawga,* and *hton swai* the presence of which showed the need for scientific investigation."

Since Colonel Entrican's note the name has cropped up again and again in the reports and diaries of district officers.

In July 1921 the Civil Surgeon, Taunggyi, sent samples of the blood of a patient convalescent from *makawlam* to the Pasteur Institute. No malarial parasites were found but a differential count of the white blood corpuscles showed an increase of mononuclear leucocytes (28 per cent.) suggestive of malaria. The serum did not give a positive Widal reaction for any of the enteric group. This case was not seen till it was convalescent.

In October 1923 the Civil Surgeon, Kyaukse, was sent by the Deputy Commissioner to investigate an unusual infant mortality and sickness generally and also the reported prevalence of the *makawlam* disease. On examining three cases at Shwelay Honyaunggya, he writes, "I could find nothing to denote the nature of this disease, but found instead an enlarged spleen and a specimen of blood showing malarial infection. I made close enquiries as to the symptoms and beyond fever and a supposed pimple on the margin of the anus which the patient himself was not aware of and which I could not find on examination, there was nothing else to go by. Every case I looked at was a case of malaria, parasites being found on microscopic examination of the blood." An examination of 204 children showed that 85 per cent. had enlarged spleens.

The same writer refers to cases which were diagnosed as *makawlam*, but which later, by the development of buboes, were recognised to be plague.

In 1924 the Civil Surgeon, Meiktila, writes about an epidemic disease known to the people as *maung kaung lon* and said to be prevalent in the Shan States.

"At Wundwin I saw several people reputed to be suffering from the disease. Three were cases of small-pox, one had some kind of fever, and the fifth and last was a child who had had three days' fever and who was about to be taken to the "doctor" for operation. I examined his rectum and saw nothing abnormal."

During 1925 *makawlam* was reported from Lawksawk and from Pindaya, but no descriptions of these outbreaks are on record. A few convalescent cases seen in the last week of December 1925 had enlarged spleens

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and anæmia and were benefited by quinine. In the blood of three out of four of these cases, malarial parasites were found.

On the 20th November, 1925, an enquiry was held into the "stated existence of *makawlam* at Nawnghkio, Northern Shan States. The Nebaing of Nawnghkio state that previous to eight years ago *makawlam* was not known in these parts. It was imported from the Loilem in the Southern Shan States."

Five *lugyies* attending this conference asserted that there was a distinctive disease called *makawlam* in Shan and *pin-le-u-chauk* in Burmese.

The senior *say saya* present stated that he had had fully 100 cases under treatment during the previous three months and a second *say saya* had had fifty. But there were no cases in the town on the day of the enquiry. One convalescent case was produced and on him the senior *say saya* demonstrated to the conference the normal folds of the mucous membrane just within the anus and stated that on these folds blebs occurred. There were none to be seen at the time "as they had been punctured and cured." In spite of the prevalence of the disease not one case had been treated at the dispensary during the year. The senior *say saya* stated that he had seen the same disease in fowls, cattle, and in a pony. No animals were produced at the conference.

In December of that year the Chairman of the District Council, Shwebo, reported that one or two cases of *makawlam* had occurred at Ye-U and that the disease seemed more dangerous than plague.

On the 7th January, 1926, the Civil Surgeon, Meiktila, saw a sub-inspector, suffering from erysipelas of the face. Burmese *say sayas* under whose treatment he had been for four days had diagnosed the case as *makawlam*. The patient and his friends were unwilling to have treatment from other than the *say sayas* who gave him eleven anal punctures and the patient died.

A few weeks later in the village of Ngazu Patte, about one mile from Kyaukse, six deaths registered as "*makawlam* and fever" occurred between 22nd January and 11th February. All had happened in two houses and only one other person attacked survived. In another village—Kyetmatun—also near Kyaukse, five persons were similarly attacked, four died and were registered as *makawlam*. The survivor was in hospital. The Civil Surgeon notes "none of the recognised signs of *makawlam* were found in her."

What these deaths were really due to does not appear.

From Yamethin the same month (January 1926) three deaths were reported as *makawlam* but a fourth case dying of the same disease was seen by the headman who recognised and registered this and the other three cases as smallpox.

At Meiktila in February 1926, the Assistant District Health Officer reported that 12 cases reported as *makawlam* by a headman were found by the Civil Surgeon to be plague.

Again in Mahlaing 14 cases of smallpox were treated as *makawlam* by puncturing the eruptions about the anus.

At Zibinpauk (Meiktila District) and at Kyette (Yamethin) cases were diagnosed first as *makawlam* and later as smallpox. At Kyette the diagnosis seems to have been changed by the *say sayas* themselves.

In June 1926 Dr. Murray of Kyaukse wrote, "in Kyaukse the disease (*makawlam*) has got a good footing. So far as my observation goes the *makawlam* cases are confused with malaria, pneumonia and plague fevers."

Certain legal aspects of *makawlam* and its treatment were submitted to the Government Prosecutor, Myingyan, and in one of the notes appears the following statement which we may be permitted to quote as we have been able to verify it ourselves in another part of the country.

"In almost every town there are a few *say sayas* who treat *makawlam*. Many laymen also understand how to prick *makawlam* and let out the poison therefrom. They can at once make out whether it is *makawlam* or not by feeling the beats of the pulse and some of them can tell without examination how many black or white boils there are."

Of five cases of *makawlam* at Kyidaunggan (Yamethin) one was diagnosed by the District Health Officer as untreated infantile diarrhœa, another as either malaria or typhoid, and three more as malaria. Eight cases at Minhla (Thazi) had returned from work in a malarious village (Tagundaing) in the Southern Shan States with fever and were diagnosed by the Assistant District Health Officer as malaria.

Investigations of the Committee.

The facts contained in this evidence have been sifted from expressions of opinion, and set forth in the foregoing paragraphs. It has been our aim to approach the subject without any preconceived ideas on the disease. No weight whatsoever has been given to second-hand evidence nor to evidence which we were unable to verify by direct access to the patients themselves. To facilitate our work, the Inspector-General of Civil Hospitals sent a circular to all civil surgeons and medical officers, Upper and Lower Burma, asking them to notify our chairman by telegram of the occurrence of two or more cases of any disease reported as *makawlam*. In response to this a telegram was received on the 19th August that cases of *makawlam* were reported from Lawksawk. On receiving a confirmatory telegram our chairman proceeded to Lawksawk arriving there on the evening of the 25th. He took with him a skilled laboratory attendant and a full travelling laboratory equipment weighing 70 *viss*. The laboratory was sufficient to undertake the thorough examination of any febrile disease. At Lawksawk he was received by the Sawbwa and by Mr. P. G. Wickham of the Camphor Estate, and we are indebted to them for their aid.

Eleven cases of *makawlam* were seen either in the acute stage or soon after their recovery. These were examined carefully and nine out of the eleven cases were proved to have malaria by the finding of parasites in the blood. There was no evidence, clinical or bacteriological, of any other disease. The remaining two cases in which our chairman failed to find parasites in the blood had anæmia and enlargement of the spleen. Clinically they were cases of malaria and of no other disease. All these cases were given adequate doses of the cinchona febrifuge issued by Government and all of them were free from fever on the 31st August and on the 1st September when the visit terminated.

Every one of these eleven cases believed that he had had the characteristic eruption at the anus but not one had felt the spots nor had any been aware of the presence of the spots until the *say sayas* discovered and punctured them. After that the part was tender and painful for one or two days. All the *say sayas* at Lawksawk corroborated these statements that the patient is quite unaware of any spot until it is punctured. Colonel Morison was able to examine carefully three patients who had been operated on and one who was sure the *makawlam* would develop. Maung Phong whose *makawlam* had been punctured the day before had a deep scratch on a fold of the anal mucous membrane, but no spot or pimple or boil could be seen externally or within, when the anus was everted as much as possible, nor was there any indication that there had been any inflammatory spot at this part recently. What had been scratched was a normal fold of the anal mucous membrane.

A second, Maung Phan, had been operated on but two hours previously. On everting the edges of the anus "it was seen that a fold of mucous membrane had been deeply scarified (a thorn had been used) sufficient to draw blood. The mucous membrane was normal in colour and free from any pimple or any inflammatory change."

A third case, a child, had been operated on the previous day. A fold of the anal mucous membrane had been deeply scratched (with a thorn) but there was no pimple and no inflammation except at the edge of the soiled scratch.

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The fourth case, Ko Ke, was seen on the first day of the fever. He had had a severe rigor and was very ill. He was sure he had *makawlam*. His son who lay beside him had *makawlam*. He himself had punctured his son's *makawlam*. He could feel nothing. He had no pain but assuredly his *makawlam* would develop. A careful examination failed to discover any trace of any eruption or inflammatory spot of any description.

Active treatment with cinchona febrifuge restored this patient in four days and the *makawlam* never appeared.

Colonel Morison through the kind offices of the Sawbwa met four of the leading *say sayas* of Lawksawk and they subsequently held a consultation on a case of *makawlam*. We give Colonel Morison's account in full.

"On the 27th August the Sawbwa kindly sent his nephew H. Kum Ok with the four leading *say sayas* of Lawksawk to see me. I explained to them that I was anxious to learn something of *makawlam*, and I would be grateful if they would tell me about it. The oldest *say saya* said that the disease had first come to this part of the country about ten years ago. Here it is called *makawlam* but in Mandalay the same disease is known as *usauna*. He proceeded to give a lecture on the disease describing it as a fever which usually lasted only a few days, and was accompanied by anal pimples, white, red, or black, the last sometimes becoming yellow. The last variety was fatal, but from the others recovery might be expected. If the patient recovered he frequently had one or several relapses. The diagnosis was made not from the pimples but from 'the way the blood ran in the veins of the wrist.' I informed them that there was a case nearby on which I would like their opinions as to whether the case was *makawlam* or no. (The case was Ko Pu who had been operated on for *makawlam* by Kunji.) The *say sayas* each in turn carefully felt the patient's pulse. As far as I could judge the senior *say saya* by altering the pressure on the pulse first with one finger then with two and then with his thumb was forming an appreciation of its rate and volume. (The pulse rate was actually about 96 and was bounding.) The senior *say saya* and two of his colleagues then expressed themselves as satisfied that the patient 'had certainly *makawlam* in his belly.' The fourth *say saya*, an old man with a kindly, open, attractive face, had so far kept silent throughout the interview and when I invited him to give his opinion he said he disagreed with his colleagues. This was a case of ordinary fever. He had never seen *makawlam* spots and pimples and did not believe there was such a disease. All fevers, he went on to say, were either mild or severe or fatal. This was a case of severe fever and could be cured by medicines given for fever.

I then showed the *say sayas* my own blood under the microscope and the blood from the patient Ko Pu in which there were benign tertian malarial parasites and explained to them that whether they called this disease *makawlam* or ordinary fever the cause was the parasites which they saw and that with adequate doses of quinine the parasite could be destroyed and the patient cured. I explained to them that I was finding the disease very prevalent and suggested that having now seen the cause they might try for themselves the treatment with cinchona febrifuge or quinine in sufficient doses.

They were obviously interested in the microscope and the next day I had a message from the Sawbwa by his nephew wishing to buy a microscope. My assistant explained, however, that it had taken him four years to learn the use of the microscope and that, without someone to use it, the microscope would be useless.

All the twelve children on the Lawksawk camphor estate had enlarged spleens.

Of nineteen anopheles mosquitoes caught in some of the patients' houses eight were identified as *Anopheles fuliginosus* and eleven as *A. barbirostris;* both are carriers of malaria."

On the 11th September, eleven days after leaving Lawksawk, Colonel Morison's servant, who had not had any fever for at least a year, had a severe attack of malignant tertian malaria which, allowing for the incubation period, he must have contracted at Lawksawk.

On receiving news from U Ba Shin, Magistrate, Yawnghwe, that *makawlam* was prevalent in Heho and Yawnghwe, one of us (Dr. U Tha Noo) and Major C. de C. Martin, I.M.S., set out for Heho, arriving there on the 30th September, and on the advice of U Ba Shin went on to Yawnghwe where the same evening Major Martin set up the fully-equipped travelling laboratory in the civil hospital.

In spite of arrangements made by the magistrate, difficulty was experienced in getting in touch with the local *say sayas* and with the cases of *makawlam*. The former had to be sought out and only one, *Saya Saing*, incidentally the *makawlam* specialist, was found. He assured Major Martin that there were then no cases of *makawlam*. He had treated a few, some of whom had died and the others were now well. A search was then made for convalescents. One was found. We extract the following from Major Martin's notes: "Po Yin contracted the disease about a week ago. *Saya Saing*, the specialist, diagnosed the case as white *makawlam* and operated on the white pimples, on the third day of illness. On the fourth day the fever and headache began to subside but Po Yin then called in the local sub-assistant surgeon to give him an injection of quinine. The patient was weak and anæmic. He would not permit a physical examination but his blood was found to be heavily infected with malignant tertian malaria. Later, Maung T. Y., a man of education, came. He said that at first he thought he was suffering from *makawlam* but 'he had no real faith in the disease.' He fancied he had malaria, bought some Esanophele in the bazaar, and had been taking this for some days. He was very anæmic, had herpes of the mouth, and numerous malignant tertian crescents were found in his blood.

A third case, Ma S. S. T., was brought the next morning in a car. She had had fever for one day followed by a remission for one day and then by fever with severe vomiting and constipation for three days. Her husband, an official of Heho, diagnosed *makawlam*, gave two *makawlam* pills and got his sister-in-law to examine his wife. Nothing was found, so the sub-assistant surgeon was sent for and an injection of quinine was administered. Her blood was found to have a 'heavy infection of benign tertian malaria.'

A fourth case, P. T. H., had had fever for ten days. Eight days ago he received an injection of quinine. Two days later 'white *makawlam*' was diagnosed by a Shan *say saya*. The pimples were said to be small and operation was not advised but *makawlam* medicine was smeared over the anus. A blood examination showed numerous malignant tertian crescents."

As no further cases were forthcoming, Dr. U Tha Noo and Major Martin went to Heho and saw five cases.

One, M. M., aged 17, had been ill for nine days with red *makawlam*. Two days ago she was operated on by *Saya* Maung's wife who found two spots. This patient had rigors, fever and sweating. When seen she was seriously ill, temperature 101.8, pulse 110 and weak. The blood showed a heavy infection with benign tertian parasites.

Two other cases diagnosed as red *makawlam* were very old people (husband and wife) suffering from acute bronchitis possibly following influenza. Dr. U Tha Noo and Major Martin examined the husband carefully and could find no abnormality though two spots had been incised eight days previously. P. K., aged 72, was sitting outside his house looking perfectly well and happy. His pulse and temperature were normal. He had complained of fever for three or four days and chancing to meet *say saya* was diagnosed as "red *makawlam*."

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Saya X was not in Heho but a lady *se saya* with a reputation for *makawlam* nearby examined the case with Dr. U Tha Noo and Major Martin. Planting her feet against his buttocks she dexterously everted the anus with her toes and pointed to a perfectly healthy-looking hæmorrhoid which she declared had red pimples in the centre. Dr. U Tha Noo and Major Martin examined the pile with a strong lens but could find no sign of anything abnormal. The blood examination in this case was negative.

Maung K, aged 25, ill for 5 or 6 days; "red *makawlam*" was diagnosed by *Saya* K. The *saya* did not look for spots as the patient had "no faith in them." The temperature was 102 and the patient had dysentery. The blood showed a heavy infection of benign tertian malaria.

In all there were eight cases of *makawlam*. Two were called simple *makawlam*. Two more were white *makawlam* and four were red *makawlam*. In all the eight cases malaria parasites were demonstrated. No cases of black *makawlam* were seen. Major Martin, as no further cases seemed to be coming forward, returned to Rangoon.

General Conclusions.

Taking the evidence set forth in the earlier part of this report and the investigation which we ourselves have been able to make, it is evident that the name *makawlam* is given by the *say sayas* to cases of fever. The diagnosis, the *say sayas* themselves claim, is made from the pulse. A rapid, bounding, febrile pulse accompanied as it always is by more or less prostration is sufficient to warrant a diagnosis. It is not surprising, therefore, that malaria, smallpox—before the eruption appears, septicæmic plague—where the buboes are not very evident—and erysipelas have actually been called *makawlam*. All these cases would by any good doctor be called "fever" until the special features of the disease appear and are recognised. We may similarly expect, as Dr. Henderson believes, that the name may be given to typhoid, pneumonia, and influenza.

The eruption to which the disease owes its name has never yet been seen by anyone with a knowledge of the normal anatomy of the anus. The anal region is peculiarly sensitive when inflamed. A small fissure, an abrasion, and much more so an inflamed spot or pimple, causes acute discomfort, particularly during defæcation and yet on the evidence of the *say sayas* and of the patients this discomfort is never felt until the spot is discovered and punctured. What is punctured is in most cases one or more of the folds of the anal mucous membrane. If a hæmorrhoid or pile presents itself this is opened and in such a case there may be more or less bleeding.

The definite classification into white, red, black, and yellow spots is as widespread as the name itself and yet this colour is discovered not by inspection of the anus but by feeling the pulse. This seems incomprehensible but it is actually true.

The operation is painful; the shouts of one patient at Lawksawk were heard by one of us and enabled this case to be examined soon after. The mental effect must be great, and as the operation is generally done when the fever is at its height, this and the natural remission of such a fever as malaria combine to give relief.

Nor is the operation free from danger. Around the anus are veins which when varicose form hæmorrhoids. Opening these veins with a dirty tool, such as a safety pin or a thorn, may induce septic clotting of the blood which if it spreads will kill the patient. Fortunately the resistance and movement of the patient and the irresoluteness of the operator usually lead to superficial scratches and not to the opening of a vein and the letting out of blood as seems to be the intention. In two cases of death after treatment in Meiktila District the prosecution of the operator was seriously considered.

In some of the evidence that has come before us, but to which we have not so far referred, there is expressed the opinion that the operation for *makawlam* is resorted to in order to extort remuneration from ignorant people. It may be that in some cases this is so; but we think that the evidence for such malpractice is not conclusive, nor is it in consonance with our own experience. At Lawksawk a father operated on his son. The *say saya* whose work one of us saw was not paid. The Deputy Commissioner, Meiktila, wrote "I am told one of the clerks in my office believes himself to be a great professor at the (*makawlam*) operation and has performed it many times free of charge in each case. It is obvious that he was acting in an entirely *bona fide* manner since he gained nothing by it." At Yawnghwe and Heho "Any female of a household may be detailed to look for the spots in a female patient and having found them to perform the operation."

We are of opinion that the operation is usually done in good faith, but in ignorance of the anatomy of the part and of the grave dangers that may follow the setting up of septic coagulation of the blood in the veins.

Makawlam attacks animals, but no reports have come to us from veterinarians. When passing through the village of Kyidaunggan the District Health Officer saw a bullock which was said to be suffering from *makawlam*. The animal was not eating well. One of the villagers opened out the anus and showed what they called typical *makawlam*.

"I could," he writes, "see no lumps but round the margin of the anus there were a few small reddened patches of discoloured mucous membrane under which some minute veins could be seen. In a human being such a condition may be associated with worms, diarrhœa or constipation, but we would never think of interfering locally."

We have already said we are in the dark as to the origin of this curious name. Not one of the ailments with which, as we have seen, the disease has been confused, is characterised by an anal eruption, and yet, where the term is used by Shans and Burmans, the definition of *makawlam* is always in the same terms, vivid and precise. Were the disease confused with anthrax, the description of white, red and black pimples would be an apt description of the anthrax vesicle, papule and carbuncle and the fatal nature of the fever would easily be understood; but nowhere in our records has there been any authentic association with that disease.

We find, therefore, *makawlam* to be an illness unknown prior to ten years ago, said to have come from the Chinese frontier across the country east of Taunggyi, a country where not a case has been found and where even its name is unknown. We find it where malaria is severe and in such places it is really malaria; or, elsewhere, it is plague or smallpox, all diseases characterised by the severity of the initial fever and, without the aid of the microscope, indistinguishable in their early stages. We find that the eruptions, as characteristic as that of smallpox, are said to be detected, counted, and their colour distinguished by the feel of the pulse by *say sayas* or other unqualified persons and yet when the part is scrutinised by skilled surgeons and physicians, each eager to elucidate a new disease, not a trace can be found.

We are driven to the conclusion that *makawlam* is a general name for "fever," which, the *say saya* at Lawksawk, looking at its termination rather than at its origin, truly divided into mild, severe, and fatal. With him we concur in believing that the spots are figments of the imagination, never really existing but honestly believed in by those ignorant of the folds of mucous membrane around the anus or of the appearance of an ordinary pile. The key to the abolition of *makawlam* is the dispelling of ignorance. Only the very poor, at Yawnghwe, had any faith in *makawlam*. The better educated, although submitting to a certain amount of treatment from *say sayas*, took the precaution of supplementing such treatment with quinine from the local civil hospital.

Nothing tends more to increase the mystery *makawlam* than ignorance of the nature of the disease,

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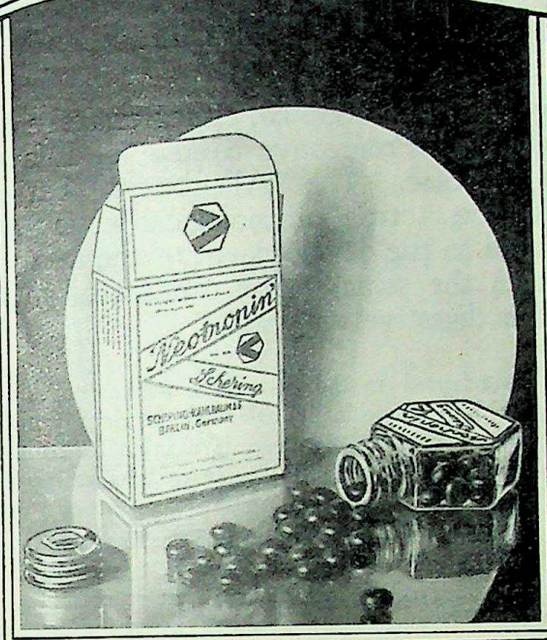

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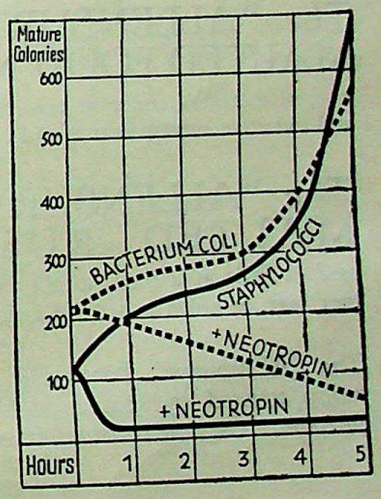

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and inefficient treatment, and of this we had evidence both at Lawksawk and at Yawnghwe.

ANNUAL REPORT AND STATISTICS OF THE GOVERNMENT GENERAL HOSPITAL, MADRAS, FOR THE YEAR 1929. MADRAS: PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS, 1930. PRICE, 2 Rupees 12 Annas.

The annual report of the Madras Government General Hospital differs from most in that a number of interesting case reports are always included. The general administrative statistics are only a matter of special interest to a limited number of readers so that in preparing the following extract we have confined ourselves mainly to case reports.

Attendance.

During the year 76,722 new out-patients and 13,595 in-patients were treated. The total daily average of out-patients including old cases was 652.20 and in-patients 535.72.

Report of the First Physician, Lieut.-Col. G. E. Malcomson, I.M.S.

A case of convulsions due to rice sensitization.—A young Indian woman, aged 17, was admitted on 5th May, 1929, with a history of repeated fits during a period of three years which were unanimously ascribed by her friends and medical advisers, and I believe by herself, to hysteria. The fits used to come on at intervals of a month, but recently they have been coming on more frequently, occasionally even on successive days.

Before the fit began she had some heaviness in the chest, then convulsions began in the limbs, spread all over the body, and she said that consciousness was lost during the fits, but she always lay down before the fit began so that she never actually fell. The onset of the fit was conditioned in no way by the presence of others. She never bit her tongue, nor did she pass urine or stools during the fit.

Later on the information was elicited that the fits have always come on after taking rice and never without taking rice. No drugs have ever had any effect on the frequency of the convulsions.

The diagnosis of hysteria seemed unlikely on account of the general demeanour of the patient; furthermore, she did herself considerable injury during the attacks complaining of severe bruises and muscular pains for several days subsequently.

The following is a description of a fit which I personally observed:—

The patient felt an oppression in the chest ten minutes after taking rice. Then, apparently unconscious of her surroundings, she had periodic violent convulsions lasting a few seconds to a minute and separated by quiescent intervals during which she lay quiet with her fists firmly clenched, and her limbs in alternate conditions of rigidity and relaxation. During this interval respiration was 30 per minute with an expiratory grunt resembling the croaking of a frog; the pulse rate was 130. The convulsion proper was roughly divisible into a tonic (rigid) period followed by a clonic (convulsive) period. During the rigid period the respiratory muscles became fixed and the grunt ceased. The convulsive period of the fit was characterized by alternate contractions and relaxations of the spine; the contractions were very violent in character and she bounced about the room like a rubber toy bruising herself against the floor and furniture. During the whole period of the fit, the pupils reacted normally to light and the conjunctival reflex was present. Plantar reflex was flexor. She was apparently insensitive to pain during the attack and did not flinch at a hypodermic injection or a pin-prick. At certain stages in the fit the grunt changed to an inspiratory one at the rate of 30 to 40 per minute, lasting a few minutes, and again being succeeded by the tonic condition during which the respiratory muscles were fixed. She did not resist when her eyes were opened. When the hands were forced open they immediately shut again and in whatever position we caused her to close them she invariably pushed the thumbs between the index and middle fingers and clenched them tightly. When her hand was forcibly opened and then allowed to shut over an object, with the thumb outside, she opened it immediately, threw away the object and again clenched her fist with the thumb in the aforesaid position. These phenomena persisted for about an hour, the active ones gradually becoming less frequent, after which the patient slept for half a day before she regained her normal consciousness. Next day she complained of severe pain all over the body and exhibited many bruises.

An unsuccessful attempt was made to demonstrate her sensitiveness by cuti-reaction to a rice extract kindly prepared by Dr. Mannadi Nayar. Likewise the ether reaction stated to be given by the urine of patients in allergic states failed. Nevertheless here is an instance of intense hypersensitiveness towards some constituent of rice, manifested by the striking and violent phenomena already described.

A case of familial albuminuria.—A young Anglo-Indian boy, 13 years of age, was admitted on 27th April, 1929, suffering from albuminuria and very considerable weakness.

Family history.—The patient is the tenth child. He says that he has only one elder brother and one younger sister living. The latter had albuminuria, but the former was free from this condition. All the other children died young, two with albuminuria at 14 years of age; no record is available as to whether the others suffered from this disability or not. His mother had albuminuria during her seventh pregnancy.

Previous history.—The patient was noticed to have albuminuria about his third year. He has been under very strict diet all along and his urine has never been free from albumin since it was first noticed. During this period he had frequently suffered from "cold on the chest" and fever. During these attacks the albumin increased enormously. Later, he was given an autovaccine for his chest trouble and also stock staphylococcal vaccine, since this organism was found in the urine. The former seemed to be of benefit, but he apparently derived no relief from the staphylococcus vaccine. He had whooping cough at seven years of age, after which he had on one occasion shown a slight tendency to asthma. At the age of nine years he developed malaria and his spleen was enlarged during this illness. At the age of 11, *i.e.*, two years ago, he suffered from temporary insanity owing to the loss of his favourite brother. This brother is said to have died of "chest cold and profuse vomiting." A specific history is emphatically denied by the parents.

Present history.—Two weeks ago the patient had a second attack of asthma which lasted for about a week. Since then he has been feeling excessively debilitated and is still suffering from cough. His albumin is said to have increased as the result of the latter illness.

Physical examination.—He was a fairly well-developed boy of 13 years old, weighing 84 lbs. He was very anæmic, his hæmoglobin being only 50 per cent. His teeth and tongue were clean, but the tonsils were very septic. The urine showed specific gravity—1009, albumin—0.25 per cent., sugar—*nil*, casts and leucocytes—*nil*. Rhonchi were heard all over both lungs; otherwise nothing abnormal was made out by physical examination.

Blood analysis gave the following results:—

Urea	..	.. 323 mgm.
Creatinine		.. 5.5 mgm.
Cholesterol		.. 166 mgm. per 100 c.cm.

The blood urea was confirmed on the following day. A further analysis of the urine gave albumin—1.5 per cent. and globulin—0.1 per cent. His blood pressure on admission was 125 systolic and 70 diastolic. The Wassermann reaction was negative.

Here is a case of an Anglo-Indian family with a very strong tendency to nephritis, the patient under observation having evidently developed secondary contracted kidney.

Report of the Second Physician, Lieut.-Col. J. M. Skinner, I.M.S.

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Two hundred and forty-five lepers attended as out-patients during the year. A large number were early nerve cases. Nodular cases were few and none of them severe. A very few advanced cases applied for treatment, and they were all nerve cases with ulcers, loss of fingers and toes and septic ulcers of the legs.

The great majority of patients applied for treatment fairly early before deformities or absorption of digits had occurred. It is becoming increasingly common for patients to apply early for the diagnosis of any patch thought to be leprosy and parents bring their children for the same purpose. All adult patients are requested to bring their children for examination and many do so. In the majority of cases one or more of the children are found to be infected.

The majority of the mofussil patients cannot afford to reside in Madras or make frequent journeys for attendance. These are referred to the medical officer of the dispensary nearest to their homes with suggestions for treatment.

The length of the treatment discourages a good many, but this is likely to pass as the results of continued treatment become known.

Every patient receives a copy of brief instructions concerning hygienic measures, such as cleanliness, food, exercise and is treated with E. C. C. O. injections.

Treatment with potassium iodide has been tried in a few cases. The doses were never large—beginning with 5 grains and, in several cases, increased to 15 grains, *b.d.* In nerve cases there was no visible improvement which could be attributed to the iodide alone. The larger doses recommended by Muir were not reached. In one moderately severe nodular case doses of 45 grains of iodide per day were finally given. There was no marked reaction. Some nodules disappeared and others softened, no new ones appeared. This patient also had E. C. C. O., in doses from 5 to 10 c.cm., twice a week. The improvement was comparatively rapid. The salt was given in divided doses of 15 grains three times a day. The use of potassium iodide was given up, as, though reactions of any severity never occurred, the patients could not be depended upon to return for treatment for control of the reaction; in the case of ignorant people it is difficult to get them to realize the importance of following advice promptly.

Statistics of cases of leprosy treated during the year 1929.

District.	Variety.			
	Anæsthetic.	Nodular.	Mixed.	Total.
Madras ..	56	16	6	78
Chingleput ..	41	7	2	50
South Arcot ..	20	4	1	25
North Arcot ..	17	..	..	17
Malabar ..	5	5	2	12
Trichinopoly ..	11	..	..	11
Salem ..	9	..	..	9
Coimbatore ..	6	..	..	6
Madura ..	5	..	..	5
Travancore (State).	5	..	..	5
Ramnad ..	3	1	..	4
Chittoor ..	4	..	..	4
Tanjore ..	4	..	..	4
Guntur ..	3	..	..	3
Godavari ..	3	..	..	3
Mysore (State) ..	..	2	..	2
Pondicherry ..	1	1	..	2
Pudukottah (State).	..	..	1	1
Nellore ..	1	..	..	1
Vizagapatam ..	1	..	..	1
Tinnevelly ..	1	..	..	1
Jubbulpore (Northern India).	1	..	..	1
Total ..	197	36	12	245

Total number of cases treated ..	245.
Shortest duration of disease on admission	1 month.
Longest duration of disease on admission	20 years.
Average duration in majority of cases	1 to 4 years.

Report of the Honorary Physician and Acting Fourth Physician, Dr. T. Krishna Menon.

Abscess of lung following tonsillectomy.—Mrs. C., 25, operated upon for tonsils—ten days later she noticed a temperature of 100°F. with lung symptoms and was being treated for broncho-pneumonia with little benefit. She was admitted into my wards; percussion showed a patch of dulness over the right lower lobe; a few crepitations were heard over the same area and the breath sounds were suppressed. *X*-ray examination showed a well-defined, small, circumscribed abscess in the upper part of the lower lobe of the right lung. As the abscess was centrally situated, it was thought inadvisable to resort to surgical measures.

In addition to the routine treatment, the patient had—

(*i*) Intravenous injections of mercurochrome 220 soluble, in 0.5 per cent. strength, commencing with 2 c.cm. and increasing it to a maximum of 10 c.cm. twice weekly.

(*ii*) Raising of the foot of the bed by two feet for two hours every day, which resulted in profuse fœtid purulent expectoration. This was continued till the patient ceased to bring up sputum.

She made an uneventful recovery in 20 days. During convalescence she had deep *x*-ray exposures once a week and carbon-arc exposures on alternate days.

Report of the First Surgeon, Lieut.-Col. E. W. C. Bradfield, I.M.S.

Wassermann reactions.—The following table shows the results obtained during the past year of routine Wassermann tests:—

Total number of patients ..	1,207.
Positive strong	2.3 per cent.
Positive moderate	3.5 „
Positive weak, including doubtful	6.66 „
Negative	87.54 „

(These presumably refer to unselected surgical cases. It is a pity that no details are given as to where these tests were done and the technique employed. One must assume that they were not done by the First Surgeon in his spare time, but he reports them without acknowledgment; the percentage of positive results is much lower than we have found amongst the general population in Bengal.—Editor, *I. M. G.*)

Mycetoma.—Mycetoma is a disease in which we have always taken great interest, but never cured. It is easy by ordinary surgical methods to improve the co-existent septic conditions and to raise hopes that treatment is going to be successful, but the fungus has always remained active. Fewer patients are now seen, because they can always have the limb amputated in their local hospital.

Dr. Vasudevan, Curator, Pathological Museum, Medical College, has provided the following notes:—

From the First Surgeon's wards three interesting cases of mycetoma were reported in which the variety, shape and situation were unusual. The first was a circumscribed spherical, somewhat firm tumour on the dorsum of the foot, which was suspected to be a sebaceous cyst. On removal and examination this was seen to consist of a distinctly-encapsuled, firm, yellowish-white tumour with pale foci. Microscopical examination revealed the condition to be one of mycetoma of the actinomycotic variety. Another was a case of actinomycosis of the foot which showed microscopically the typical "ray fungus." Attempts at culturing the fungus were made both aerobically and anaerobically with negative results. The third was a case of the pink variety of mycetoma (actinomycotic) very rarely seen in these parts.

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The tablets are smooth coated, medium size and easily swallowed.

SANG-CRE, adequately administered, rapidly increases the red blood corpuscles to normal and is, in consequence, of exceptional benefit for the treatment of simple Anæmias known as reduced and poor blood conditions.

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Government Repatriation Hospital, Sydney
Royal South Sydney Hospital, Sydney

Extract from the Medical Journal of Australia, October 4, 1930.

(The Official Journal of the B.M.A. in Australia.)

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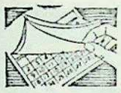
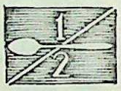
In preparation for the operation one tablespoonful of Agarol on retiring in place of the usual castor oil, will insure against gastric upset. Again, a few days later  when the patient begins to take nourishment Agarol in half doses  is the logical eliminant because it stimulates peristalsis gently without griping or pain.

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Five other rare specimens of mycetoma were also described. One of these was from the Second Surgeon's wards and others from elsewhere in this presidency. Of them one was another case of the actinomycotic variety of mycetoma of the foot showing the typical "ray fungus." Three others were specimens showing spherical cystic masses containing dark, inky granules consisting of maduromyces. One of these was from the sacral region involving the skin and deep subcutaneous tissues, another was from the sole and the third on the dorsum of the foot.

The last was a case of mycetoma involving the knee joint, the synovial membrane showing dark, inky granules consisting of actinomycotic fungi.

Pancreatic calculi.—A patient aged 60 was admitted for a large cystic swelling in the abdomen. The cystic cavity was formed of the greater part of the head of the pancreas and contained four green pancreatic stones. The cystic cavity which contained semi-purulent fluid was dealt with by marsupialisation to the abdominal wall. The patient's condition did not improve much and he was removed from hospital in a dying condition.

Cancer.

The incidence during the year is shown in the following tables:—

Malignant cases.

Myeloma	1
Sarcoma	41
Rodent ulcer (ear)	2
Carcinoma	367
TOTAL ..	411

Sarcomata.

Melanotic	3	
Bones	10	(femur 6).
Others	28	
TOTAL ..	41	

Carcinomata.

Malignant tumour abdomen, not classified	9
Malignant glands primary, not noted ..	6
Breast	42
Larynx	8
Stomach	16
Cheek and jaw	143
Tongue	44
Tonsils	4
Œsophagus	4
Rectum	25
Liver	4
Penis	27
Cervix*	8
Other situations	24
Cutaneous	3
TOTAL ..	367

* Gynæcology patients usually go to special hospitals.

Radium treatment.

The knowledge that there is a supply of radium in the General Hospital has undoubtedly attracted a large number of these patients and the statistics bear out, what has been reported before, that the incidence is very much the same in south India as it is in other parts of the world. Formerly we have commented on the comparative rarity of cancer of the breast, but during the past year this belief has been upset; it is suggested that there is a tendency for women to conceal the disease. One patient admitted to a medical ward was found quite by accident to have an old cancer of the breast which has been treated, apparently successfully, with radium.

The following table shows the effects of radium treatment:—

—	Cleared.	Improved.	Increased.	Died.	No report.	Total.	REMARKS.
Cheek ..	2	3	3	..	14	22	
Tongue ..	2	3	..	..	2	7	
Tongue and floor of mouth.	1	..	..	..	1	2	
Floor of mouth.	..	..	..	1	1	2	
Sarcoma ..	..	1*	..	..	1	2	* Chest wall.
Palate ..	..	..	..	1†	..	1	† At first much improved.
External ear	..	1	..	..	..	1	
Breast ..	1	3	..	4	4	12	
Parotid ..	2	..	..	..	..	2‡	‡ One was recurrent endothelioma. One had radium-implantation after removal and is free after 21 months.
Larynx ..	..	..	..	1	..	1§	§ Teletherapy.
Cervix uteri	..	..	..	..	1	1	
Penis ..	..	1	..	1‖	1	3	‖ During treatment.
Œsophagus	..	..	..	2¶	..	2	¶ 1 Teletherapy, 1 cavitary method—no improvement.
Nasopharyngeal sarcoma.	..	1	..	..	..	1	
Nose ..	..	2**	1	..	..	3	** Both sarcomata.
Meninges	..	1††	1	1	..	3	†† Adenocarcinoma—recent case—very great improvement.
Rectum ..	1	..	..	1	2‡‡	4	‡‡ Both relieved of pain when in hospital.
TOTAL ..	9	16	5	12	27	69	

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These figures are obviously of no value as an estimation of final cure and although they mainly refer to patients treated since my return from leave in August they are not entirely discouraging. In nine patients classed as cleared, no evidence of cancer could be found several months after cessation of treatment. Two of these had had fairly extensive cancer of the cheek, a disease in which our operative results have always been appalling. Radium caused diminution of pain in several patients shown in columns 3 and 4, but cases shown as improved are only those in which, from the condition when last seen, we are hopeful of the disease clearing. Follow-up attempts have always been disappointing, and it is unfortunate that we already seem to have lost touch with some of these patients.

Of the several methods of applying radium, interstitial implantations and surface application, with prepared paste, gave the best results and our technique does not differ from that described by several recent writers. During two periods we tried a modified teletherapy method; 250 mgm. of radium—most of our supply—was collected into a packet, or bomb, and patients submitted to distance irradiation at 10 cm. from the skin for four hours daily, for a period of 14 days. Each patient thus received a dose of 14 gramme-hours. Captain Barnard invented a very ingenious apparatus with lead screening for this treatment. One patient, with a recurring endothelioma of the parotid, was very much improved and after further surface application was apparently cured, but results with the remaining patients were not encouraging and with our limited supply of radium, 330 mgm., the method of distance irradiation is not economical. The experiment is not worth repeating unless a large supply of radium can be placed at our disposal.

The best results are undoubtedly obtained in cancer of the breast, tongue and floor of mouth, and we have entirely abandoned operative treatment for malignant disease of the tongue. Our results are really more promising in cancer of the breast, for in two patients who died, the original breast cancer had entirely melted away and one of these, an old lady of 70, died from a secondary deposit in the spine without any of the distressing symptoms usually associated with cancer.

The patient with adenocarcinoma of the meninges who improved is worth recording. An operation elsewhere for what appeared to be a sebaceous cyst in the scalp resulted in alarming bleeding and the patient was hurried to the hospital. Hæmorrhage from a tumour, adenocarcinomatous in character, which had eroded the skull in the frontal region was stopped by the actual cautery. At a later date the patient was given 120 mgm. of radium element as a surface application for eight days, a total dose of 9,648 milligramme-hours. The result has been remarkable and when last seen, six weeks after treatment, there was every appearance of the growth "melting away."

Cancer of the cheek, with its spread to the mandible or maxilla, still remains our greatest problem and the impression gained by a study of 22 cases during the past year is that if we can evolve a suitable radium technique and can see the patients early enough the disease in this region can be dealt with. In many years' experience of this disease in south India I have seen very few patients cured by operative methods. The remarkable effect on an ulcerative leucoplakic condition which follows removal of the teeth, leads one sometimes to wonder whether even some of these successful results, when unconfirmed by microscopic examination were really cancer. Cancer of the cheek, though often slow growing, once it has invaded the muscles spreads far and insidiously and it would seem that it is this muscle spread which is difficult to control and effectively to bombard with our rays. Two patients returned with an extension of the growth although the centre and main tumour which had been well irradiated then appeared soft and free. Our method has been to implant the radium needles throughout and around the obvious growth making as effective a pattern as possible, and to retain them for at least eight days. The needles have been secured in position by sutures or by the method of retrograde needling, one end of the thread being drawn through the mouth and, after knotting to the outside end, fixed to the cheek by strapping. Duration of radiation appears to have been of more importance than massive dosage; the larger doses, in needles of 2 to 5 mgm., in some cases running up to a total of 8,000 mgm.-hours, which we have been compelled to use by limitations of supply and needle strength, seem to have been responsible for the necrosis which has occasionally occurred. The method we propose to aim at is a number of small needles containing 0.6 to 1 mgm. of radium carefully distributed over the growth. In successful cases the ulcerated mucous membrane often becomes covered by a thin yellowish fibrinous deposit and in a few weeks the area again becomes soft and pliable. Superficial necrosis of the jaw occurred in two cases, but it is a risk that must be taken; both appeared to be superficial and could be dealt with easily by ordinary methods. The irradiated area also loses its pigment. Fortunately the glands are affected late in cancer of the cheek, but otherwise in our experience the disease is far more resistant to radium than is cancer of the tongue, or floor of the mouth.

REPORT ON THE SESSION OF THE OFFICE INTERNATIONAL D'HYGIENE PUBLIQUE HELD IN PARIS IN OCTOBER 1930. BY BREVET-COLONEL F. P. MACKIE, O.B.E., K.H.S., I.M.S., DELEGATE FOR THE GOVERNMENT OF INDIA. DELHI: GOVERNMENT OF INDIA PRESS, 1931.

The "Office" is the permanent organisation of the countries signatory to the various International Sanitary Conventions. The latest of these is that of 1926, which has been ratified by practically all the countries signatory to the 1912 convention. India, however, has not yet ratified the 1926 convention, one of the underlying reasons possibly being that ratification entails several expensive obligations in her major ports. The Office holds two annual sessions, in May and October. These are attended by a representative of the Government of India, who is usually the Public Health Commissioner. In October 1930, the Government of India representative was Brevet-Colonel F. P. Mackie, I.M.S. The subjects discussed are usually cognate to the working of the International Sanitary Convention, but subjects of general sanitary interest and importance are also discussed. At this session several matters of interest to India were dealt with. The Haj pilgrimage is governed by rules under the International Sanitary Convention. Lately, in India a Haj Pilgrims Committee sat and made various recommendations. This enquiry agreed that it would be better for pilgrims from India to be inoculated against cholera and small-pox, as they were thereby exempt from some of the hardships and disagreeable restraints at quarantine pilgrimage ports. There was a discussion on the significance of various suspicious vibrios (choleraic) isolated from pilgrims at Tor. The Egyptian quarantine board, on the strength of finding these, declared the pilgrimage "infected," with resulting stringent restrictions on the pilgrims. The Government of the Hedjaz objected. The occurrence showed the necessity for some authoritative pronouncement on which a cholera vibrio is or may be identified, if this is possible. (It will be remembered that the meeting of research workers in Calcutta in November 1930 agreed that a commission to investigate cholera in India in all its aspects is necessary.) The session of the Office discussed the possibility of getting a single monovalent serum applicable to all choleragenic vibrios. The burying of cholera corpses at sea was objected to by the Japanese delegates who stated that fish might thereby become infected and so spread the disease to human beings. This was considered rather a far-fetched idea by the session.

Deratisation certificates from Indian ports.—Under the I. S. C. such certificates if complete and satisfactory

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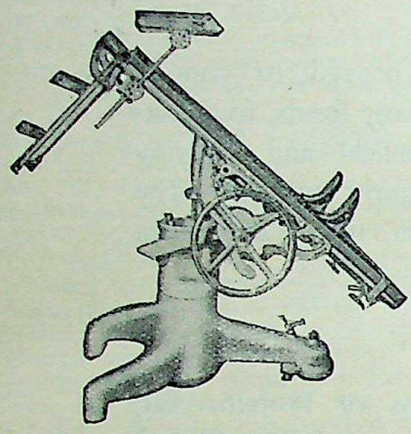
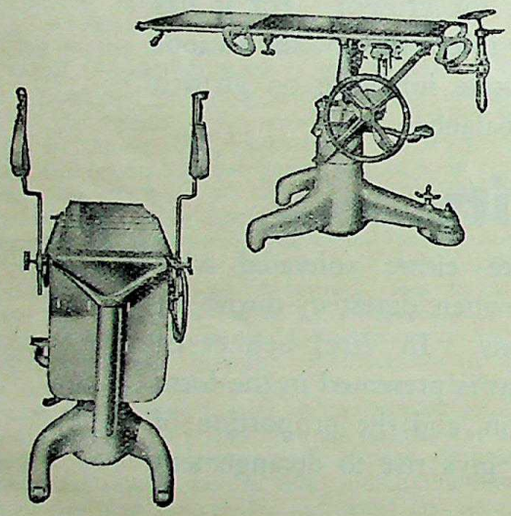
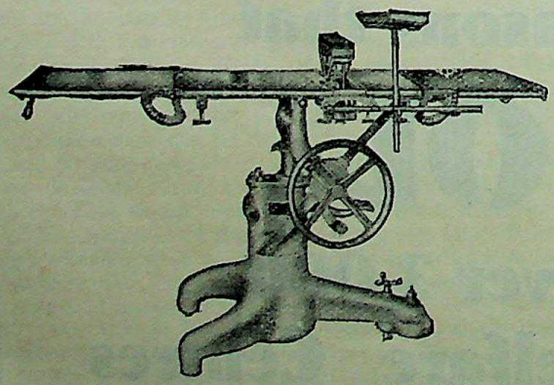
St. Bartholomew's Hospital Operation Table







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may ensure exemption at other ports. Some complaints have apparently been received that arrangements for issuing such certificates have not been made in some Indian ports. The session of the Office agreed to issue a reminder to the Government of India on the matter.

The subject of yellow fever is of importance to India. Lieut.-Col. James, I.M.S. (retired), of the Ministry of Health, London, gave a résumé of present-day knowledge of the subject. The report is not clear on one point. It says that at least 13 species of mosquito (mostly Aedes) have been found able to transmit yellow fever and then mentions 13 "insects," of which one is the bed-bug, as possible transmitters. Hindle's vaccine is still experimental. James concludes that prophylactic regulations against the spread of yellow fever should be based on attacking the disease in endemic centres rather than on defence measures in potentially affected areas. Yellow fever in relationship to aerial navigation is of importance to India. Certain proposals in regard to aerial navigation in its relation to yellow fever put forward by the Pan-American Sanitary Bureau were considered. The Government of India has already prohibited the import of yellow fever virus into India for any purpose.

The sanitary control of aerial navigation is a subject attracting much attention at present. The British Government has put forward certain proposals as a basis for discussion and agreement. These refer particularly to:—

(1) The provision of special protection against yellow fever.

(2) The principle that the sanitary aerodrome should be regarded and devised as a sanitary *enclave*, apart from the particular area where it happens to be.

(3) The consideration of bills of health and sanitary visas.

Ships doctors.—Arrangements have now been made in some countries for special and refresher courses of instruction for ships doctors.

Small-pox and vaccination.—There is now a considerable body of opinion which considers vaccination by intradermal inoculation as superior and freer from risks than the present method of scarification. In official circles, three years is becoming accepted as a period of protection by vaccination after which re-vaccination is desirable. Other subjects were discussed; these were mainly of local interest, but a few were of general interest.

Correspondence.

INJECTION TREATMENT OF HYDROCELE.

To the Editor, The Indian Medical Gazette.

Sir,—The treatment of varicose veins has passed out of the domain of surgery owing to the injection method and it appears likely that the treatment of hydrocele will also go the same way. Dr. K. Venkat Rao's is not an isolated attempt to treat hydrocele by a sclerosing fluid. There are some practitioners in western India who advertise cure of hydrocele by a single painless injection. Being tempted to find out what this solution could be, I tried quinine urea first as being an anæsthetic. I injected fifteen grains of this salt in 10 cubic centimetres of distilled water into the serous cavity after emptying it completely. The sac filled up again nearly to the former size; I tapped it after a week and a thin red fluid came out. The patient was then asked to report weekly, which he did regularly; the fluid was absorbed completely in a month. Since then I have tried this method in six more cases with complete success in three and equally complete failure in the others. The cause of failure could not be ascertained. The solution may have been too weak or some fluid may have remained in the sac to dilute it. In two of these cases the fluid drawn out at the next tapping was clear and not bloody as in the others, showing that no reaction had taken place. One was injected again, but with no better result. One of the first two came for retapping three weeks later, and I found on emptying the sac that the serous coat was getting very much thickened; one could easily feel its thickened walls slipping between the fingers.

My technique is to tap the hydrocele with an ordinary trocar and cannula as completely as possible, and then inject 10 cubic centimetres of one per cent. solution of quinine urea out of ampoules, sterilized in an autoclave, by means of a spinal-puncture needle passing through the cannula which is left *in situ*, or a blunt serum needle of sufficient length. Slight pain is experienced in the inguinal region for a minute or so, but nothing at all afterwards. The cannula is carefully withdrawn after pinching the sac between the fingers to prevent any solution getting into the cellular tissues. The fluid is massaged all round, and then the patient allowed to go home with instructions to report once a week. A second tapping is done. This is somewhat painful owing to the tenderness of the sac. A large-bore sharp needle is more convenient to use at this tapping. A blood-stained fluid is usually drawn out. The sac partly fills up again, but the fluid is reabsorbed in about a month or a little more. The patient is attending his ordinary duties all the time with no discomfort. To beginners I would suggest that the cannula should be driven well into the sac, as otherwise there is the possibility of its slipping out into the cellular tissues during the manipulations of emptying it.

I have never been an advocate of the injection method but, in the light of the present experience, I think that, if a painless sclerosing fluid is found, the treatment of hydrocele will be no longer in the surgeons' province, except in exceptional cases or in failures of the injection method.—Yours, etc.,

D. M. VASAVADA, L.M.S.,
Haji Dawood Hospital,

Jetpur (Kathiawar),
28*th July*, 1931.

ANOTHER NOTE ON STOVARSOL.

To the Editor, The Indian Medical Gazette.

Sir,—I was interested to find a letter from Captain G. H. Fitzgerald, I.M.S., in your *Gazette*, on the subject of the administration of Stovarsol in cases of diarrhœa.

I have used Stovarsol for some time now in those cases of diarrhœa which show up in great numbers with the advent of the fly season and where a laboratory examination fails to find any pathogenic organisms, also, with great success, in cases of diarrhœa where the non-pathogenic *Giardia intestinalis* has been reported as being found in large numbers. These latter cases in particular responded wonderfully to Stovarsol, which acts like a specific.

My practice differs slightly from Captain Fitzgerald's, as I order one tablet three times a day until I find the stools definitely clearing up, and then one tablet every morning for six days. This method of treatment I have found deals successfully with those cases of diarrhœa for which no adequate cause—other than perhaps an indiscretion of diet, or a change of water—is found, and which are commonly spoken of as "weak tummy," "Bangalore belly," or "summer diarrhœa."

In cases where *Entamœba histolytica* cysts are found my experience with the use of Stovarsol is no less gratifying.—Yours, etc.,

C. D. TORPY,
Military Assistant Surgeon, I.M.D.

Secunderabad
(Deccan).

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Service Notes.

Appointments and Transfers.

The services of Brevet-Colonel F. P. Mackie, O.B.E., K.H.S., Director, Haffkine Institute, Bombay, have been placed at the disposal of the Government of Assam, with effect from the afternoon of the 22nd April, 1931, for employment as Director of the Pasteur Institute and Medical Research Institute, Shillong, during the absence on leave of Lieutenant-Colonel J. Morison.

Lieutenant-Colonel M. S. Irani is appointed to officiate as Civil Surgeon, Dharwar, with attached duties, *vice* Major B. F. Eminson, granted leave.

On return from leave, Lieutenant-Colonel R. F. Steel to be Civil Surgeon, Poona, and Superintendent, B. J. Medical School, Poona.

Major B. Z. Shah, at present on general duty at the Sassoon Hospitals, Poona, to take over charge of the post of Civil Surgeon, Poona, from Major Spackman and to hold it until Lieutenant-Colonel Steel's return from leave.

Major W. C. Spackman to officiate as Superintendent, St. George's Hospital, Bombay, until further orders, *vice* Lieutenant-Colonel P. K. Gilroy, M.C., proceeding on leave.

Major S. D. S. Greval, an officer of the Medical Research Department, has been posted as a supernumerary officer at the Haffkine Institute, Bombay, with effect from the 3rd July, 1931.

Major L. A. P. Anderson has been appointed as Acting Director, Haffkine Institute, Bombay, with effect from the 3rd July, 1931.

Captain M. P. Atkinson has been posted as Legation Surgeon, Nepal, and *ex-officio* Assistant to the British Envoy at the Court of Nepal, with effect from the 12th August, 1931.

Promotion.

Lieutenant-Colonel H. H. Thorburn, C.I.E., has been promoted as Brevet-Colonel, with effect from the 1st July, 1931.

The officers named below have been promoted from the rank of Major to that of Lieutenant-Colonel, with effect from the 27th July, 1931:—

R. H. Candy.
J. C. Bharucha.
H. Hingston.
F. J. Anderson, M.C.
P. F. Gow, D.S.O.
H. J. M. Cursetjee, D.S.O.
J. S. S. Martin.
R. V. Morrison.
E. S. Goss, M.C.
A. W. Duncan.

The promotion of Major G. V. Ram Mohan to the rank of Major has been ante-dated to the 20th October, 1928.

Captain S. D. S. Greval has been promoted to the rank of Major, with effect from the 12th May, 1931.

Lieutenant (on probation) B. Temple-Raston to be Captain (on probation) (provisional), 22nd June, 1931.

The promotion of Lieutenant-Colonel E. G. Kennedy to the ranks of Major and Lieutenant-Colonel has been ante-dated to 29th July, 1921, and 29th July, 1929, respectively.

Captain M. P. Atkinson has been promoted to the rank of Major, with effect from the 12th August, 1931.

Captain P. N. Lahiri has been promoted to the rank of Major, with effect from the 28th July, 1931.

The undermentioned officers have been promoted to the rank of Captain (prov.):—

Lieutenant E. A. R. Ardeshir, 16th December, 1930.

Lieutenant P. L. O'Neill, 30th April, 1931.

Leave.

Lieutenant-Colonel P. K. Gilroy, M.C., Superintendent, St. George's Hospital, Bombay, is permitted to proceed on leave on medical certificate for twelve months, with effect from 25th July, 1931.

Major B. F. Eminson, Civil Surgeon, Dharwar, is granted leave on average pay for 8 months followed by leave on half average pay for 4 months, with effect from 1st October, 1931, or subsequent date of availing.

Major Jamal-ud-Din, Civil Surgeon, Ferozepore, has been granted leave for 2 months, with effect from 1st August, 1931 (afternoon).

Lieutenant-Colonel R. B. Seymour-Sewell, Director, Zoological Survey of India, has been granted leave out of India for 12 months, with effect from the 15th September, 1931.

Lieutenant-Colonel F. Stevenson has been granted leave for 8 months, with effect from the 3rd August, 1931.

Miscellaneous.

The names of the undermentioned officers of the Indian Medical Service have been brought to notice for distinguished services rendered during operations on the North-West Frontier of India during the period 23rd April to 12th September, 1930, by His Excellency Field-Marshal Sir William Birdwood, *Bart.*, G.C.B., G.C.S.I., G.C.M.G., C.I.E., D.S.O., late Commander-in-Chief in India:—

Colonel L. P. Brassey, Assistant Director of Medical Services, Peshawar District.

Captain H. J. Rice, M.C.

Retirements.

Lieutenant-Colonel J. Anderson, with effect from the 14th July, 1931.

Lieutenant-Colonel F. P. Warwick, D.S.O., with effect from the 26th July, 1931.

Resignation.

Lieutenant R. A. Paton has resigned his commission, with effect from the 16th April, 1931.

Notes.

IRRADOL.

Ultra-Violet Light and Vitamin D.

Huldschinsky was the first (1919) to show by experiments that ultra-violet light has a curative effect on rickets, acting in the same manner as cod-liver oil.

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A complete infant food

In extra-uterine life, the infant has to rely upon milk to supply those essential salts to which experts in infant dietetics now attach great importance.

It has recently been shown that the iron content of cows' milk is considerably below that of human milk and may be inadequate to the requirements of an infant.

In Sunshine Glaxo, the fully humanised milk-food, the need of the infant for a complete diet with the mineral and vitamin factors scientifically adjusted, is fully met

(a) by adding to the milk the optimum amount of vitamin D.

(b) by such adjustment of the iron content as renders the product comparable, in this respect, with human milk.

The milk used in the preparation of Sunshine Glaxo is obtained from the healthiest herds of New Zealand cows, fed entirely on green pastures. Its purity, its fine, easily digested curd, and its humanised formula, make Sunshine Glaxo the food of choice when breast-feeding is either impossible or needs to be supplemented.

SUNSHINE GLAXO

Sole Agents: H. J. FOSTER & Co. Ltd.,
P.O Box. 202, Bombay. P.O. Box 2257, Calcutta. P.O. Box 108, Madras.

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SCIENTIFIC ENZYME DIGESTION

RICH SELECTED ENGLISH MILK
Pancreatised

SELECTED ENGLISH WHEAT
Dextrinised and Pancreatised

PREDIGESTED MILK
(25% Protein Conversion)

PREDIGESTED WHEAT
(25% Starch Conversion)

Powdered by the
COW & GATE
Improved
Roller Process

Peptalac
REGD.

THE NEW INSTANT PREDIGESTED FOOD

SIX OUTSTANDING ADVANTAGES

1 PEPTALAC is "made in a minute" by the simple addition of hot water giving in an instant a digested milk food of high digestibility.

2 PEPTALAC is fool-proof and requires neither technique, skill nor addition of milk. It renders obsolete the method of peptonisation wherein milk had to be held at a temperature 117°F. for 20-30 minutes under carefully controlled conditions.

3 PEPTALAC is guaranteed to have been pancreatised and the essential components of starch and milk proteins broken down to sugars, peptones, and amino-acids. With other methods of peptonisation this cleavage is uncertain and unreliable and the milk which is added is not predigested.

4 PEPTALAC is a safe and practically sterile powder. In the old methods of peptonisation, the milk was predigested at a temperature which is also favourable to the growth of organisms, thus resulting in a final product teeming with bacteria. Reconstituted PEPTALAC is free from pathogenic organisms and practically sterile.

5 PEPTALAC is therefore invaluable for infants, young children, the aged, convalescents, and the weak in health, who are prone to contract milk-borne diseases from ordinary milk or preparations made with it.

6 PEPTALAC is pleasing to the most fastidious palates—salt or chocolate may be added for further flavouring if desired.

SEND THE COUPON FOR FREE CLINICAL SAMPLE

MANUFACTURERS OF THE
Cow & Gate Milk Food
CELEBRATED COW & GATE MILK FOOD

Name .....

Address .....

.....

Agents:—CARR & CO., LTD., Ballard Estate, BOMBAY.

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Mellanby observed that sunshine has a beneficial anti-rachitic influence. Hess (1921-1922) first brought out the fact that summer sunlight in itself will prevent and cure rickets, and that the shorter ultra-violet rays are more effective than the longer ones. Shipley, McCollum and their associates summarized this thought very aptly, thus: "Cod-liver oil contains something which is essential for optimal cellular function. Light also contains something which is essential for optimal function. Cod-liver oil or light, when made available to an organism previously deprived of either, permit the organism to put into successful operation adaptations or defence mechanisms which otherwise would have been ineffectual. Neither cod-liver oil nor light meets the defects in composition of the diet directly by supplying to the body either calcium or phosphorus, but meets them indirectly by so raising the potential of cellular activity as to cause the most efficient utilization possible of those substances available in the body which are directly or indirectly concerned with ossification and calcification."

Activation.

Many investigations with cod-liver oil and light in their relation to rickets resulted in the discovery that the radiant energy from the ultra-violet mercury-arc lamp imparts to vegetable oil and to such foods as starch, cereal grains, animal tissue, milk, etc., an anti-rachitic potency of the same type as that which medicinal cod-liver oil possesses.

Irradiation of Ergosterol.

The bio-physical and bio-chemical changes resulting from the activation of ergosterol by ultra-violet light have been made the subject of study by several investigators. Among these have been Webster, Bourdillon and associates, Bills, Pohl, and Sumi. It is evident, from the numerous studies reported, that ergosterol, when irradiated *by wave lengths between* 270 *and* 290 *millimicrons*, possesses vitamin-D activity, and that the double bond in its chemical structure is absolutely essential if the transformation is to take place. However, all workers are agreed that in the end only a fractional percentage, generally 5 to 10 per cent., of the ergosterol is vitamin D. That is to say, the transformation of ergosterol into vitamin D, by irradiation, is accompanied by a partial destruction of the vitamin D thus formed. Limitation of this breaking-down of the vitamin D while its formation is going on is one of the special efforts of the manufacturers.

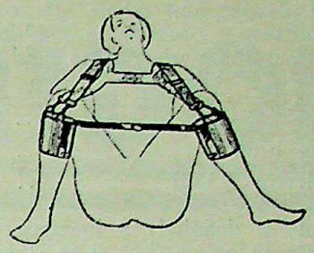
The method of irradiation followed by various laboratories has had to be worked out more or less independently, and consequently varies in certain details.

Irradol.

In their manufacture of Irradol Messrs. Parke, Davis and Co. lay special stress on controlling the various steps in the manufacture to retard the production of by-effects on the ergosterol. Thus, they claim to employ only the pure white, crystalline ergosterol. This is dissolved to a definite concentration in an organic solvent which has been redistilled to eliminate any aldehydes, peroxides, and peroxidases. The solution is then subjected to the ultra-violet light, being scrupulously protected from oxidation or other undesirable changes. The distance from the mercury arc burner to the solution, the time of exposure, and the intensity of the current, are all definitely controlled. In the end, the irradiated solution is so handled during the recovery of the solvent and the solution of the irradiated ergosterol in oil as to preclude breaking-down of the vitamin D. The oil solution is then diluted in a neutral vegetable oil to make it correspond in vitamin-D activity to the Steenbock standard (250D). From time to time a check assay is then made on the final solution.

NEW LITHOTOMY SUPPORT.

Since Clover invented his "crutch" for lithotomy, and incidentally for obstetric use, there have been many modified models made to surmount its defects, *viz.*, its cumbersomeness, its inefficaciousness in keeping



the legs and feet from obtruding on the perineal area, and the disadvantage of having the whole weight of the body borne by a strap round the neck. The need for an appliance which remedies the above faults is undeniable and we believe that this new "crutch" fulfils the necessary requirements for satisfactory working.

Baron's new lithotomy support is light, compact, collapsible and can be conveniently carried in the midwifery or other bag.

It consists of:—

(*a*) Bands of webbing which are arranged to fit on to the shoulders instead of on to the neck.

(*b*) Pads to fit below the knees to which the four ends of the bands are secured; these bands are adjustable so that complete flexion of the hip and knee can be obtained in any sized person.

(*c*) A collapsible metal support made of four links, which when fixed in position not only keeps the legs apart but also outwardly directed from the knees; it is impossible for the support to be collapsed by the patient.

Method of application.

This support is applied either before or during anæsthesia, preferably with the patient in the dorsal position. The bands of webbing (arranged like the letter H) are placed across the shoulders with the transverse connecting piece behind. The pads, with the incorporated metal plates placed along the inner surface of each tibia, are then securely fixed just below the knees by means of the adjusting buckles. The bands of webbing from the back of the shoulders are clipped on to the outer side of the knee pads, and the front bands are attached to the inner side of the pads. By manipulating the adjusting bars which are provided on the bands of webbing, these are either lengthened or shortened until complete flexion of each leg is obtained. The collapsible metal support consists of four links, the inner two of which form the cross-bar when opened out, and to each outer end a link is pivoted at an obtuse angle, and these latter links are arranged to fit into slots in the knee pads. When these are inserted and the inner links opened out until automatically locked, there is formed a leg separator and abductor.

ELIXIR VALIBROM B.D.H.

Valerian has been employed in medicine for centuries on account of its valuable sedative action and its freedom from toxic effects, and an extract is known to possess a sedative action on the higher nerve centres.

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It is only comparatively recently, however, that a method has been devised for deodorising preparations of this drug. Physicians are now prescribing valerian freely in the treatment of diseases of the nervous system, whereas in former times they were often deterred by the knowledge of its unpleasant odour.

Elixir Valibrom B.D.H. is a clear liquid possessing an agreeable flavour and odour. It contains chloralamide and potassium bromide in combination with an odourless extract of valerian. One fluid ounce of the elixir contains:

Chloralamide	10 grains
Potassium bromide	20 grains
Extr. valerian B.D.H. ..	2 grains

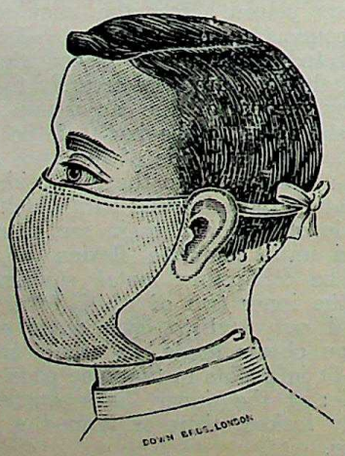
Chloralamide is definitely a hypnotic; it resembles chloral hydrate in action, but it is stated to be less toxic to the heart and to the respiratory system; hence it is safer than the latter compound. The value of potassium bromide in allaying general nervous excitation is universally recognised; its administration is particularly useful as an adjunct to valerian therapy.

Elixir Valibrom B.D.H. is particularly useful in the treatment of insomnia, especially the simple or idiopathic form when due to nervousness, hysteria, chronic alcoholism and similar conditions; it is useful also as an aid in overcoming the opium habit. In some cases of aneurism, erysipelas, rheumatic fever and gall-stones it produces an analgesic effect.

A SIMPLE FACE MASK FOR THE PREVENTION OF PUERPERAL SEPSIS.

The belief that many cases of puerperal sepsis result, directly or indirectly, from infection from the throats, noses, etc., of those who are in attendance upon the cases and who are carriers of virulent organisms, has been growing in strength during the last few years. Therefore it has become necessary that some efficient means of protection from droplet infection should be devised. A good maternity mask should conform to the following requirements:—

(*a*) It should be cheap; (*b*) it should be comfortable; (*c*) it must be efficient to prevent the passage of organisms through it; and (*d*) it should be easy to sterilise in the home.



During the last three years experiments have been made with different masks, the essential parts of which have consisted of a shield of jaconet mounted upon varying kinds of frames.

As a result of these experiments a mask which has met with general approval has been devised.

The mask consists of a piece of jaconet attached to a strip of flexible aluminium, to the ends of which tapes are attached, which are tied round the back of the head. The strip is moulded by the wearer to the shape of his nose and face. To the lower side of the jaconet is attached a light, open, metal neck-spring, which serves to prevent the mask from flapping forward when the wearer bends forward. The mask can be sterilised by simple washing with a strong antiseptic solution. It is germ proof, does not fog the glasses, can be worn in any place, and is reasonably comfortable.

We feel sure that its general use, by doctors and midwives, would lessen materially the incidence of puerperal sepsis.

This mask is obtainable from Messrs. Down Brothers, Limited, of 21 & 23, St. Thomas's Street, London, S.E. 1. The price is only 1 shilling.

"COW AND GATE" MILK FOOD.

There is no subject which is more important in the realm of dietetics than the feeding of young, delicate children, and of invalids, and more and more the nurse has come to realise that she must be well versed in this branch of her work. With the new-born child, the mother's milk is the best food, and no one will dispute this fact, but the nurse more often than not comes into contact with an infant which is divorced from its mother by illness or with the child whose mother is unable to feed it. Again, when the child comes to be weaned milk food is essential.

The manufacturers' claims for Cow & Gate Milk Food are substantiated in each case. First, that the milk is not vomited as is often the case with fresh milk, however modified. There is little need to point out the advantage of this fact to the nurse. Secondly, that the milk does not turn sour and will keep sweet in hot climates. The dangers of milk "turning" in variable weather or in the summer cannot be over-emphasised, nor the consequent diarrhœa which often results from sour milk or milk boiled in unclean vessels. In the small household where the storing accommodation is often unsatisfactory, and where the refrigerator is unknown, it is no easy task for the busy mother to maintain that strict regard for cleanliness and freshness which are so necessary to the rearing of a young child. Again, the claim that the milk is economical is another point in its favour. Further, it is stated that the milk is digestible and palatable. No matter how digestible it might be, without the second claim it would be worthless, for the child will not touch food which it does not like, neither will it digest it. (Extract from the *Nursing Mirror and Midwives' Journal*, 11th January, 1930.)

S. U. P. 36.

S. U. P. 36 is a comparatively recently-introduced remedy for colds, influenza, pneumonia, bronchopneumonia, and other inflammatory or septic conditions. The manufacturers, British Drug Houses Limited, have sent in the following note:—

The basic principle underlying the action of S. U. P. 36 is the stimulation of the host's protective substance in order to enable it to combat invading organisms and to prevent their multiplication. This theory is discussed and the results of research in regard to it are reported on by Mr. J. E. R. McDonagh, F.R.C.S. (*The Nature of Disease*, parts i and ii, Heinemann, Ltd., London).

S. U. P. 36 belongs to the group of substances known as "symmetrical ureas"; its actual function is supposed to be that of a conductor, that is to say, it is suggested as an explanation of its action that it conducts electrons to the protein particles of the plasma, the point of protection of the host, the invading micro-organism

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"Bayer-Meister Lucius"

'PYRAMIDON'

The reliable

Analgesic - - It affords rapid relief in pain of varied ætiology, neuralgia, toothache, earache, etc.

Antirheumatic In all rheumatic affections including gonorrhœal arthritis.

Antipyretic - In all acute febrile conditions including influenza, erysipelas, etc., almost a specific in Measles (according to Brit. Med. Journ., December 1929).

Literature and full particulars on application :

"Bayer-Meister Lucius"

HAVERO TRADING CO. LTD.,
Pharmaceutical Department,
P. O. Box No. 2122, 15, Clive Street, CALCUTTA.

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FIBROLYSIN

E. MERCK
DARMSTADT

Cicatricial Resolvent

in the treatment of all abnormal formations of scar tissue:

Scars
Stenosis
Adhesions
Strictures
Fibrositis
Middle-ear deafness
Rheumatoid arthritis

Fibrolysin acts in a specific manner upon cicatricial tissue softening and loosening the fascicular substance, which has become hardened since its original inflammatory formation — and ultimately dispersing it through the lymph stream, the volume of which is concurrently increased. Its effect is confined to the pathological area.

It may be injected intravenously, hypodermically, or preferably intramuscularly.

Obtainable as follows:

'FIBROLYSIN' for injection — 10 ampoules of 2.3 c.c.
'FIBROLYSIN' for the eye — 10 lymph tubes.
'FIBROLYSIN' for veterinary use — boxes of 5 ampoules of 11.5 c.c. each.

Further particulars may be obtained from the

Agents in India:—

MESSRS MARTIN & HARRIS, LTD.,

Rowlette Building,
17, Prinsep Street,
CALCUTTA

119, Parsi Bazar Street,
Fort,
BOMBAY

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having induced a state of dehydration which must be corrected by the reinforcement of electrons.

The action of S. U. P. 36 is definitely therapeutic—not prophylactic—and its use is indicated in inflammatory conditions accompanied by high temperature, as for example in influenza, pneumonia and broncho-pneumonia, and in particular in catarrhal infections and broncho-pneumonia of young children. In such conditions a timely injection of 0.01 gramme (or 0.005 in the case of children) of S. U. P. 36, as soon as diagnosis has been established, will often abort the attack, and a second injection on the following day will clear up all symptoms with surprising rapidity.

DIATHERMY APPARATUS.

Watson and Sons, the well-known makers of electro-medical apparatus, are making a speciality of diathermy apparatus and have just issued an interesting catalogue.

In spite of the rapidly increasing use of diathermy and the consequent multiplication of the number of diathermy machines in use, there is admittedly still considerable room for improvement in the design and construction of diathermy apparatus. Without question numbers of physicians and surgeons hesitate to essay the practice of diathermy largely from a fear of the intricacy and unreliability of the apparatus available.

This situation is easily understood. There is in these days a constant call for apparatus with a greater output; this has made the production of dependable equipment a task of the utmost difficulty even for the conscientious manufacturer. The irresponsible trader, concerned only with profits, has of course made no serious attempt to meet these difficulties, and has been content to issue apparatus which is difficult to manipulate, inadequate or erratic in output, and unreliable in performance.

There exists, not without some reason, the impression that the electrical aspect of diathermy is a matter of much complication and difficulty. But there is no need, whatsoever, for the medical practitioner to encumber his mind with a great deal of electrical knowledge regarding diathermy apparatus. The various textbooks will enable those who wish to go deeply into the theory of the subject to do so, but the majority of practitioners will find sufficient scope in the purely medical or surgical aspects of diathermy. However, the following few notes on the general principles of diathermy may interest some of our readers.

When an electrical current flows through a conductor it has to overcome a certain resistance which varies according to the nature of the conductor. In overcoming this resistance heat is produced, the amount of heat depending upon the strength of the current and the resistance of the conductor. This is true whether the current is direct, *i.e.*, uni-directional, or alternating, *i.e.*, flowing first in one direction and then in the other. When, however, an alternating current changes its direction at a comparatively slow rate there is also a stimulating and exciting effect on the muscular and nervous systems, which, if the current were strong enough to produce sufficient heat for therapeutic purposes, would be fatal. This is known as the Faradic effect. If, however, the current is made to alternate or change direction exceptionally rapidly, with a frequency of the order of a million times or more per second, the Faradic effect disappears. Heating of those tissues through which the current passes, to a degree depending upon their resistance and the intensity of the current flowing through them, is then the only effect experienced.

Diathermy apparatus is merely equipment designed to produce continuously currents of the necessary intensity alternating with sufficient rapidity. The ordinary methods of producing alternating currents are not suitable for the production of currents of that high frequency needed for diathermy, and a special type of apparatus has to be employed.

The Production of Therapeutic Fever.

For the treatment of paresis and similar diseases in which a general rise of body temperature is required, it has been claimed that diathermy is more convenient and satisfactory than the injection of toxic organisms and other methods generally used to produce the required artificial fever. Briefly stated the procedure is to envelop the patient in rubber sheeting and blankets to prevent dissipation of heat and to pass a heavy current between large electrodes placed on the chest, abdomen and back. The output of Watson's diathermy machines being exceptionally heavy they are particularly suitable for this class of work.

For this class of work the manufacturers recommend the "Sunic" senior model. There are other models in their catalogue, the "Sunic" junior and portable models. The catalogue or any further information that is required may be obtained by writing to the Bombay Office:—Watson and Sons (Electro-Medical), Limited, Commerce House, Currimbhoy Road, Ballard Estate, Bombay.

"HYPOLOID" SODIUM MORRHUATE.

"Hypoloid" sodium morrhuate is now available as a sclerosing agent for the treatment of varicose veins. It is claimed that sodium morrhuate has distinct advantages over other sclerosing agents. Sodium morrhuate is stated to be innocuous to the subcutaneous tissues, thus reducing the risk of an "injection ulcer" to a minimum; its non-toxicity allows it to be administered in large doses.

A total dosage of up to 10 c.cm. of a 10 per cent. solution may be given at one sitting but in practice such large quantities are not often required. A 5 per cent. solution is usually quite strong enough and the use of the 10 per cent. solution is necessary only in those cases in which the weaker solution has failed to cause sufficient reaction. In most cases ½ c.cm. to 1 c.cm. of a 5 per cent. solution is injected at each puncture, the length of vein treated at one time depending upon its size and the condition of the patient. With correct dosage and spacing of punctures periphlebitis is stated to be rare and obliteration of the vein is obtained with the minimum of pain and discomfort.

"Hypoloid" sodium morrhuate is issued in 5 per cent. and 10 per cent. solutions in boxes of 5 hermetically-sealed phials of 2 c.cm. each; and also in bottles of 25 c.cm. by Burroughs, Wellcome & Co.

EUPAVERIN, E. MERCK, DARMSTADT.

In cases of renal, biliary and intestinal colic, morphine is still employed, despite the fact that it exerts no appreciable local action and acts merely as a palliative. In point of fact morphine increases the activity of the reflexes and as a natural consequence conditions of motoric excitation prove to be far less influenced by it than pain. Apart from this lack of direct therapeutic action, the use of the narcotic is attended by the ever-present danger of drug addiction. The advent of a new non-narcotic synthetic preparation exerting a specific local action on the smooth involuntary muscles of the body should consequently be very welcome.

Eupaverin is a new synthetic compound said to possess the peculiar property of relieving the tension of smooth muscles, especially of hollow organs, without impairing their function. It is claimed that relief from colic attends immediately the intravenous administration of a dose of 0.03 to 0.06 gm. of Eupaverin. In severe cases 0.06 gm. should be given. The preparation is equally suited for peroral or hypodermic

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administration and no untoward effects have been observed even after the largest therapeutic doses.

SINUSITIS.

Where other measures have failed to bring relief in obstinate sinusitis Antiphlogistine should be tried. Every physician knows that success in the overcoming of this affection depends on free drainage and ventilation.

Antiphlogistine has hyperæmic, osmotic and relaxant powers; its application over the affected regions: (1) Relieves the pain; (2) dissipates the congestion; and (3) establishes drainage. Pressure, due to accumulated exudates, is relieved and the toxic influence upon nerve terminals, due to the presence of pus and other products of inflammation, is ended.

Physicians are invited to write to the Denver Chemical Mfg. Co., 163, Varick Street, New York, for samples and literature.

THE TREATMENT OF CHOLANGITIS AND CHOLELITHIASIS BY DECHOLIN.

It has been found that certain derivatives of diphenyl-chinolin-carbonic acid have a definite beneficial effect on the liver, in that following their administration there is improvement in diseases of both the gall bladder and bile ducts. It has been reported that in certain cases of gall-stones there was so marked an improvement that the patients considered themselves cured.

Decholin is said to be the sodium salt of dehydrocholic acid. This acts in a similar manner and is said to produce an even more marked cholagogic effect.

The local agent for Decholin is Francis Klein, 29, Strand Road, Calcutta.

AN ELECTRIC RECTOSCOPE.

An electric rectoscope just placed on the market has many new features. It gives brilliant illumination of the wall of the anal canal and rectum throughout the whole length of the speculum. Surgeons and general practitioners will find it a compact, simple apparatus which will obviate many of the difficulties of investigating and treating the common diseases of the rectum. It gives every convenience for diagnostic examination, injection treatment of hæmorrhoids, and many other procedures. One of the most important features of this instrument is the detachable cover placed over the lamp which allows the operator to clean the speculum of all fluid fæces without soiling the lamp. It is made by John Smith and Son (Glasgow), Ltd., 28, Gibson Street, Hillhead, Glasgow, and we understand it may be ordered through any surgical house in India.

THE SERUM TREATMENT (STREPTOSERIN) OF INFLAMMATORY DISEASES OF THE FEMALE GENITAL APPARATUS ESPECIALLY OF PARAMETRITIS.

Twenty-one female patients suffering from inflammatory diseases of the genital apparatus, especially parametritis, were treated with Streptoserin. In 16 cases there was a decided effect on the local condition; in 5 there was no traceable influence to be observed; and in 2 this treatment was an absolute failure. Epicritically, it is not possible to decide whether the failures are due to a heterogeneous bacterial ætiology (*i.e.*, staphylococcal and gonococcal). On account of the good results in the majority of cases, the treatment of local inflammation of the genital apparatus, especially of the parametrium, with Streptoserin is well worth further trial. (Abstracted from *Die Therapie der Gegenwart*, 1930, part 12, p. 542.)

ANTIPNEUMOCOCCIC SERUM, FELTON.

It may interest our readers to hear that Felton's antipneumococcic serum has for some time past been manufactured by Messrs. Parke, Davis and Company, and is now available in India. It is offered in bulbs containing 10,000 Felton units of each type (I and II) and is standardised according to the Felton method, as required by the National Institute of Health, Washington.

Full particulars may be obtained from the manufacturer's head office in India:—Messrs. Parke, Davis and Company, Lloyds Building, Graham Road, Ballard Estate, P. O. Box 88, Bombay, India.

THE TREATMENT OF PRURITUS.

In a case of pruritus universalis, where no therapy proved to be of any avail, the attendant physician had resort to injections of Omnadin every second day without any other adjuvant treatment. Marked improvement was seen after the second injection and the fourth injection brought about a complete cure. The same physician has used Omnadin since in a few more cases of pruritus quite successfully, the cure setting in mostly after the fourth injection. (Abstracted from *Der praktische Artz.*, 1931, No. 1, p. 28.)

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Original Articles.

A THEORY OF THE ÆTIOLOGY AND EPIDEMIOLOGY OF KALA-AZAR IN INDIA.

By L. EVERARD NAPIER, M.R.C.S., L.R.C.P.,
and
K. V. KRISHNAN, M.B., M.R.C.P.E., D.B. (Lond.).
(From the Kala-azar Research Department, Calcutta School of Tropical Medicine and the Kala-azar Enquiry of the Indian Research Fund Association.)

CERTAIN recent observations regarding the incidence and distribution of the dermal lesions, and others regarding the epidemiology of the visceral disease, caused by *Leishmania donovani* have encouraged the writers to evolve a theory of the epidemiology of kala-azar.

The theory is based largely on observed occurrences, but also on analogy. In order not to confuse the reader an attempt has been made to avoid as far as possible intermingling the records of clinical and experimental observations, with theoretical considerations; the case has first been stated and then as summarily as possible each supporting observation has been recorded as a footnote.

Finally, the writers have tried to indicate here and there the lines of enquiry which might be followed to adduce further evidence in *support* of this theory; time alone can prove it.

Host immunity.

Our knowledge of immunity in protozoal diseases is limited, but it is obvious that on the part of the host's tissues there must be some mechanism which limits protozoal invasion. If in this connection we use the word "immunity" it must be understood that we use it in the very widest sense; whether it is of the nature of a lytic action of the body fluids on the parasite, whether it is a phagocytic action of the tissue cells, or whether it is a matter of cell permeability and food supply, we do not propose to discuss here.

There is evidence of the existence of a *natural* immunity, as disease does not follow the introduction of the parasite in every case(1).

There is evidence that this natural immunity differs in different host genera, as some are apparently entirely immune whilst others are comparatively susceptible(2), and in different individuals of the same genus, or even species, as children of certain ages are much more susceptible than adults(3).

There is evidence of the existence of acquired immunity as after establishment of the infection spontaneous cure may occur(4).

This acquired immunity in persons who survive the infection is complete and is maintained for a long time; second attacks are almost unknown(5).

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(1) Instances in which the introduction of a large amount of morbid material does not produce the disease in animals are numerous. In man, Maggiore (1925) carried out a number of experiments with human volunteers using both spleen-puncture material and cultures with entirely negative results, and the senior writer (Napier, 1930) has on two occasions driven a hypodermic needle into his finger immediately after withdrawal from the spleen of a kala-azar patient; the last occasion was more than six years ago.

(2) The literature on the infection of animals with leishmania is voluminous; Napier (1930) has recently summarized this. The susceptibility of animals varies considerably; some, for example hamsters (*Cricetulus griseus* and *Cricetus frumentarius*), are very susceptible even to small doses of the virus and suffer an intense infection (though without correspondingly intense clinical manifestations); others, for example monkeys, can usually be infected by massive doses of the virus; as a rule they only suffer a transitory infection, though occasionally a fulminant form of the disease has been noted (Knowles, Napier and Das Gupta, 1923); whilst yet others, for example rabbits and guinea-pigs, cannot apparently be infected at all.

(3) The higher incidence of the disease amongst children has long been recognised (Turkhud, Krishnan and Seetharam, 1926). The senior writer considers that he demonstrated in a recent investigation (Napier and Das Gupta, 1931) that this is a matter of great susceptibility of the children of certain ages.

(4) The earlier workers on kala-azar in India, such as Rogers, Megaw, Muir and Dodds Price, while recognising it as a very fatal disease admitted that it was not always fatal and that patients with signs and symptoms of advanced disease sometimes recovered without any treatment that could be described as specific, or without suffering from secondary infections, such as pneumonia, which have frequently been known to terminate a leishmania infection successfully. With the introduction of the specific antimony treatment the opportunities of observing the natural course in well-established cases have diminished almost to zero.

With regard to transitory infections the senior writer has had personal experience of 7 cases, and has heard of others, in which an early infection, diagnosed parasitologically, completely cleared up without any specific treatment. Of these, three patients were diagnosed as malaria by parasitological findings; cultures for leishmania were taken on admission, in two cases the patient had been treated and discharged before the culture was examined and in the other the patient was well and remained afebrile for two months, after which a second leishmania culture was "negative." Two other patients were suffering from clinical typhoid; from one *B. typhosus* was recovered. The remaining two were clinically cases of malaria. Of the 7 patients two were hospital servants and were kept under observation for a number of years—seven in one case—two were inmates of a Calcutta orphanage and were also traced for some years; of the remainder, information about one was obtained two years later. In no case did the patients receive any antimony, and in no case did clinical kala-azar supervene. In two cases blood cultures were taken for leishmania after 3 and 2 years, respectively, both with negative results.

(5) After nearly 11 years' experience in one locality during which time he has seen over 10,000 cases of kala-azar including many hundreds of cases of relapse, the senior writer has only encountered two cases in which he considers that there was any reasonable evidence of a re-infection having occurred; these were both children, aged 2 and 4 years, respectively. They were each treated within a month of the beginning of the first attack. They returned to their residences in the endemic area in Calcutta and after being well for

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It is permissible to assume that after generations of subjection to infection the host population in a specific area will undergo a change as regards their immunity.

Let us assume for the sake of argument that the parasite is introduced by the bite of a sand-fly(6) and is lodged in the sub-papillary layer in the skin(7); here there are present certain cells of the reticulo-endothelial system. The parasite is taken up by(8), or gains entrance to, these. Within these cells it is in a comparatively favourable environment and it multiplies, slowly. The parasite does little damage to that cell(9); there is little immunity response, and such as there is is only local; this may be sufficient to bring about the death of the parasites; if not, they will remain in this situation as a sub-clinical focus of infection(10).

Then the patient suffers from malaria(11) or typhoid; during this attack there is a reaction in the reticulo-endothelial tissues and

15 and 17 months, respectively, they were again brought to the hospital with attacks very similar to the first. In each case the serum tests suggested that we were dealing with early kala-azar.

In a paper on treatment the senior writer Napier (1932) has gone into the question of relapse and re-infection. Fifty cases of second attack were investigated and the evidence suggested strongly that they were all cases of relapse, *not* re-infection.

There is a possibility that immunity in a person who recovers naturally from the infection may not be of the same nature as that of the patient who recovers after treatment; but of the two the naturally-acquired immunity is likely to be the more permanent.

(6) The evidence on this point is sufficiently strong to warrant its acceptance as a working hypothesis.

(7) The method of feeding of sandflies has been well shown by Shortt and Swaminath (1928). They found that when feeding on a mouse the proboscis of the fly penetrates to a depth about six times that of the thickness of the epidermal layer of the skin; this is not deep enough to reach the larger capillaries and these workers consider that the flies obtain their food by rupturing the smaller vessels in this area and then feeding from the extravasated blood. The length of the proboscis of *P. argentipes* is 250 μ; thus, in man it will reach through the epidermis into the papillary layer of the corium, and it is probable that feeding occurs by the same process. A plug of flagellates injected would thus not be swept away immediately by the blood stream, but would remain in the tissues locally.

(8) This is an assumption not entirely unsupported by experiment—mixing flagellates with kala-azar-patients blood results in the flagellates being taken up by the leucocytes, more especially by the large mononuclears. We are at present engaged in work to show that this occurs in the tissues also.

(9) From examination of stained films of blood or of spleen puncture material there is no evidence that parasitization impairs the vitality of these cells.

(10) It would be almost impossible to produce evidence of the existence in the skin of such foci, but that sub-clinical foci do exist somewhere in the residents in the endemic area is evidenced by the fact that from time to time persons who have at one time lived in the endemic area develop kala-azar after having lived for some years in a non-endemic area. The best example of this in our personal experience was that of an officer who came from Madras but who had lived one year in Peshawar and two years in Aden before he developed any symptoms suggestive of kala-azar; he returned to India and was definitely diagnosed as suffering from kala-azar on protozoological evidence. In support of the skin localization of these sub-clinical foci is the fact that parasites have been demonstrated in the skin, both in the presence and in the absence of skin lesions (Cash and Hu, 1927).

(11) As far back as 1922 the senior writer expressed the view that kala-azar is probably only the clinical expression, determined by some secondary factor, of an infection which in the endemic areas is much more widespread than the disease itself. Though his experience indicated that malaria and typhoid were the usual determining factors, he took the view that it was by the lowering of the general resistance that the patient became susceptible. More recently, following the investigation of Lloyd, Napier and Pal (1929) and Lloyd and Pal (1929) into the serum-protein changes in kala-azar, malaria and typhoid, he has adopted more definitely the opinion that these two diseases produce a *specific* change which allows the visceral infection to occur; this view is expressed in the former of these two papers. The work of the junior writer (Krishnan, 1930) has confirmed this opinion as to the *specific* nature of the "lowered resistance" in malaria patients, and the more recent work, as yet unpublished, of the Kala-azar Enquiry at the Calcutta School of Tropical Medicine is adding further support. The senior writer is now coming round to the view that it is not a matter of the patient being in a more receptive state during an attack of either of these diseases, but that the attack determines the generalization of an infection which was previously established locally. A short summary of the historical, epidemiological and clinical observations which have led to the adoption of this view is given below:—

The idea that other diseases play an important part in the epidemiology of kala-azar is probably a very old one—it was given definite expression by McCombie-Young (1924) who considers that epidemics have been determined by circumstances which have periodically lowered the general vitality of the population, *e.g.*, the Assam earthquake of 1896, and the influenza pandemic of 1918. He also considers that the great Burdwan epidemic of the "sixties", about the nature of which there has been so much controversy, was probably one of malaria followed by kala-azar, but again he is definite in his opinion that it is the *general* lowering of resistance that determines the onset of the disease. Both Rogers and Ross when they investigated the Assam epidemic at the end of the last century concluded that kala-azar was a form of malaria—presumably on the grounds that it was always associated with definitely diagnosed malaria, though they recognised that it was a chronic, resistant form of the disease. The feeling that the disease was malaria was so strong that even after the parasite had been demonstrated certain leading practitioners in India, notably Sir Koilash Chandra Bose, went so far as to try to demonstrate that the Leishman-Donovan body was a metamorphosed form of the malarial parasite.

As far as India is concerned practically all kala-azar-endemic areas are malarious districts; the reverse is of course not true.

It is difficult to trace any accurate correlation between the degree of the malaria and kala-azar incidences in any areas in Bengal or Assam, but there is, apparently, a general agreement.

In Madras Turkhud, Krishnan and Seetharam (1926) showed that in every kala-azar-endemic area visited by them there was a very close correlation between the degree of incidence of kala-azar and of malaria. During each malarial season there occurred a fresh crop of kala-azar cases and on the degree of malaria prevalence depended the exact number of kala-azar cases. Furthermore, amongst the cases attending hospital during a malarial season they noticed that the majority of cases of fever and enlarged spleen in children turned out to be kala-azar while most of the adults showed a malarial infection. These workers have also

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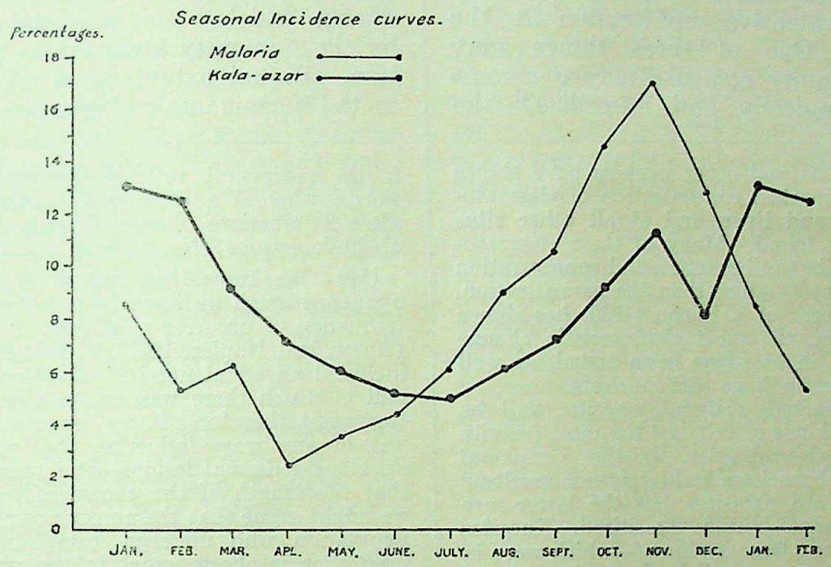
a mobilization of large mononuclears in the blood(12), infected cells are carried from the skin focus to the visceral reticulo-endothelial tissues and a general visceral infection

recorded one instance where in an isolated village with a population of about 500 people epidemics of malaria and kala-azar co-existed. While it was certain that practically every one in the village suffered from malaria, only 128 cases attended the hospital and of these 105 were diagnosed as malaria and 23 as kala-azar. All the kala-azar cases were among children and 21 of these died within 2 years for want of treatment.

With reference to the seasonal distributions, it will be seen that the malaria-incidence curve of Knowles and Senior-White (1930) and Napier's (1927) kala-azar-onset curve correspond very closely; they both rise sharply up to November; after this the former falls, but the latter is sustained.

has made the statement that about 75 per cent. of the enteric patients from one particular area—the kala-azar-endemic area in Calcutta—develop kala-azar in hospital or return within a month or so with the disease. This statement is probably not based on accurately collected data, but the officer who made the observation did not know that it fitted in with any theory the writers might have. More accurate investigation on this point is being contemplated.

An obvious means of investigation as to how frequently the typhoid-like onset in kala-azar patients is the result of an infection by the enteric group would be the performance of the Widal test in all cases giving this history. But Shanks and Khan (1926) have shown



The senior writer (1921 and 1923), as well as many of his predecessors, have described the clinical onset of kala-azar as being either of the malarial or of the typhoid type: patients giving a history of a malaria-like onset usually state that the fever at first appeared to react to quinine and that later quinine had little or no effect.

Against this hypothesis might be urged the fact that the coexistence of malarial and leishmania parasites in the blood is rare. This is true, but it is not evidence against our theory. It is very evident that some change takes place in the body during an attack of kala-azar which prevents extensive multiplication of malarial parasites and we have again and again seen the incident which is shown graphically on page 180 of Napier's (1927) book on kala-azar—after antimony treatment has brought down the typical kala-azar temperature to normal, the patient suffers from a typical malaria temperature and parasites appear in his peripheral blood. We have found that it is necessary to give a course of quinine or cinchona in more than half our kala-azar cases.

With mofussil patients a malaria-like onset is the rule, but occasionally a history of a typhoid-like onset is given. With persons living in Calcutta the reverse is usually the case; the typhoid-like onset is the rule. It is not only a question of a typhoid-like onset, but the number of instances of bacteriologically-diagnosed typhoid fever which have "developed into" kala-azar in our experience during the last 10 years is considerable: two cases are quoted by Napier in the annual report of the Calcutta School of Tropical Medicine for 1922 (Napier, 1923). The experience of other workers in Calcutta confirms this observation. Shanks and Khan (1926) report 5 instances in which kala-azar developed in bacteriologically-diagnosed typhoid cases, and a resident medical officer at the large European Hospital

that in kala-azar patients the agglutinating power of the serum rapidly disappears and the writers have been able to confirm this observation in a number of instances.

In 1923 in order to test his hypothesis that leishmania infection was more widespread than the actual disease kala-azar, the senior writer took 100 blood cultures in N. N. N. medium of persons living in close proximity to kala-azar patients. These cultures were all "sterile." This is not surprising as the presence of leishmania in the peripheral blood is probably an "accident," and, though a common accident when there is a visceral infection, it is unlikely to occur when there is only a localised focus.

The incubation period in kala-azar has never been determined and appears to vary from a few weeks to a number of years. This irregularity in the incubation time, the fact that there is no regularity in the time interval between primary and secondary cases occurring in a house (Napier and Das Gupta, 1931), the frequency of the appearance of the kala-azar attack immediately after the typhoid infection, and the close coincidence of the malaria and kala-azar seasonal-incidence curves all suggest that the secondary factor determines the generalisation of an infection which is widespread amongst the indigenous population of the kala-azar-endemic areas. On the other hand the cold-weather rise in the kala-azar curve might be explained by the monsoon and post-monsoon increase in the sandfly prevalence, or by the coincidence of this with the high malarial incidence.

(12) That there is a mobilization of the large macrophage cells in the circulation in typhoid and malaria has been noticed since very early times; Mallory (1898) and MacCallum (1903) described them as being poured out into the peripheral blood in typhoid, and Pappenheim (1900) and Schilling (1919) reported them in the blood of malarial patients.

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becomes established. There is now a more general immunity response. Whether this is of a humoral or a cellular nature we need not guess—it is probably a combination of the two—but it is certainly accompanied by a local concentration of clasmatocytes at the visceral foci(13) of infection and an intensification of the large-mononuclear mobilization(14) in the blood. Many of the mononuclears contain leishmania(15) so that parasitized cells are carried to every region of the body(16). Parasites will be widely distributed in the corium, but the general immunity response though initiated by—and concentrated at the foci of—the visceral infection, will be sufficient to prevent any extensive proliferation at the dermal foci(17). One of three things may happen; the immunity response may overcome the infection completely and "sterilize" the patient; the immunity response may overcome the visceral infection but the stimulus may be insufficient to produce(18) the necessary reaction in the peripheral reticulo-endothelial cells and the skin infection may survive; or, finally, the immunity response may be inadequate so that the parasitic infection eventually kills the patient(19). [We are of course only considering the untreated patients—we believe that treatment only acts by stimulating immunity response(20).] In the cases of the first and third eventualities the infection, as far as that patient is concerned, has no future, but in the case of the second the subsequent history is usually that after an interval of some months, during which time development is controlled by the immunity response to the visceral infection, gradual extension of the infection occurs in the corium and after about a year the first

(13) Meleney (1925) and other workers have shown that there is a very marked concentration of clasmatocytes in the spleen and liver, and at all other sites where leishmania are found. Many of these clasmatocytes are parasitized, but cell reaction and concentration is a much more marked feature than the parasitization.

(14) The recent work of Krishnan (1930) has shown that, after leucopenia, the most characteristic change in the blood picture in kala-azar is an actual, as well as a relative, increase in large mononuclears.

(15) In spleen-puncture material parasites will be seen in a number of kinds of cell, but the most heavily parasitized are the clasmatocytes. In the peripheral blood both polymorphonuclears and large mononuclears are seen with contained parasites, but the latter are more frequently and more heavily parasitized. Knowles (1920) showed that the "large hyalines"—which were in all probability the clasmatocytes of other writers—were more heavily and, relatively, more frequently parasitized than the polymorphonuclears, furthermore he was of the opinion that in the former the parasites were viable whereas in the latter they showed signs of degeneration.

(16) In hamsters infected with leishmania parasites can be found in large numbers in the skin and subcutaneous tissues. Cash and Hu (1927) were able to show by cutting sections of the skin of various parts of the body in cases of kala-azar that leishmania were present in the skin in 4 out of 20 specimens. They refer to two other cases in which they demonstrated the parasites by this means. The skin was normal in appearance.

We have examined a number of skin sections of kala-azar patients in Calcutta, but have so far not confirmed these findings. We are at present taking skin specimens of all out-patients prior to the commencement of treatment, in order to clear up this point.

(17) This is a very reasonable assumption. We have had under our charge many persons who have had kala-azar for three years or more and in none of these has the dermal condition supervened during the time that they were suffering from the visceral disease. Yet other patients after receiving a course of treatment and being cured of the visceral infection show the first signs of dermal lesion with fair regularity about one year later. Thus, the determining factor would appear to be, not the length of time that the infection has been present, but the length of time since the influence of some inhibiting factor was withdrawn.

(18) In the case of the immunity response which we assume (*vide infra*) is stimulated by treatment, we know that the stimulus required to produce the necessary response in the visceral reticulo-endothelial system is quite inadequate to produce the necessary response in the peripheral reticulo-endothelial cells; in other words, whereas a cure in kala-azar can be expected after 8 injections, dermal lesions often resist a course of 30 injections (Napier and Haldar, 1930).

(19) We know that any of these three things may happen, though we have little indication of the relative frequency of occurrence of each event. Our first series (Acton and Napier, 1927) of dermal leishmaniasis cases included an equal number of cases in which there was, and in which there was not, a history of kala-azar and treatment therefor. If we assume that treatment does not in any way influence the patient's chances of developing dermal lesions—and there is little indication that the length of the course of treatment does this—we might argue that the number of persons in the general population who undergo complete recovery without treatment is about equal to the number who undergo treatment. In our Kaorapukur series (Napier and Das Gupta, 1931) we calculated that 5 per cent. of our cured kala-azar patients developed dermal lesions.

(20) It has not been decided how antimony acts in the treatment in leishmania infections, but it is almost certain that the drug does not exert a direct toxic action on the parasite; in support of this statement we have the observations that *in vitro* the parasites flourish in comparatively high concentrations (1 in 100) of therapeutically efficacious compounds and that antimony, when given in the form of the pentavalent compounds, is excreted almost completely within a few days (Boyd and Roy, 1929, and Boyd, Napier and Roy, 1930) whereas parasites are almost always present in the spleen at the conclusion of a sufficient course of injections (Napier, 1932), disappearing from the organs in the course of a few weeks without further treatment being administered.

An obvious explanation of these observations is that the antimony raises the patient's specific immunity response in such a way as to overcome the infection; whether this immunity response is the same as the immunity response of natural cure is, of course, not certain. The case quoted in the footnote 24 (*vide infra*) suggests that there are two kinds of immunity response and that the early institution of treatment may interfere with the development of the natural, and more permanent, immunization of the patient. As supporting evidence we have the observation that the 15 dermal leishmaniasis patients who were treated by us for kala-azar, and whose original notes we have been able to trace, were all but one comparatively early cases when they came under treatment, only one of them had a + + + aldehyde-test result, whereas more than 50 per cent. of the kala-azar hospital-patient population give a + + + reaction. This question, however, has no direct bearing on the present discussion.

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clinically-obvious lesions(21), usually the depigmented patches, are produced. Local extension continues and nodules are formed; eventually in rare cases the extensive disfiguring lesions, some of which resemble xanthoma tuberosum multiplex, are the result(22).

On the other hand the activities of the parasite in the skin may produce a local immunity which will overcome the skin infection in any stage of its development(23).

It is scarcely possible to conceive of a primary extensive skin infection without an intermediate visceral infection, but the latter may have been transitory and produced only a very mild clinical attack. Were such a thing possible and the visceral attack of such a mild nature that only transitory immunity was produced, it is conceivable that at a later date a typical visceral attack might occur(24).

Thus, to summarize, to a person subjected to infection one of four things may occur; (*a*) there may be a temporary local focus in which the parasite is soon destroyed, the patient escaping morbidity entirely, (*b*) the patient may suffer from a transitory visceral infection only; (*c*) he may suffer from a temporary visceral infection followed by a dermal infection; or (*d*) he may suffer from a fatal visceral infection. Given a constant infecting "dose" and the constant presence of the complicating factors, *e.g.*, malaria, the fate of the parasite is dependent on host immunity. That is to say, the frequency of the occurrence of the four events, *a*, *b*, *c* and *d*, in a community will depend on the immunity possessed by that community as a whole; where the immunity is low '*d*' will have the greatest value and as the immunity increases the values of *c*, *b* and *a* will increase, in that order.

The population of Bengal has now been subjected to the infection for some generations(25), consequently the disease when it appears, even where no treatment is given, is not the catastrophic event that it was in the historic Burdwan (Bengal) epidemic of 1860 or in the more recent Assam epidemics, and the dermal lesions are a far more common sequela(26) of the disease than they are in the more-recently-invaded Assam valley(27). In the latter province, as the general immunity of the population rises, dermal lesions may be expected to become more common.

Parasitic variability.

The particular strain of *Leishmania donovani* that has become localized in the skin, when passed on to another host, will be more likely to produce skin lesions than will a strain recovered from the blood or spleen(28). It is suggested that in Bengal the parasite is

(21) The mean period that elapsed between the time of disappearance of the visceral lesions and the time at which the dermal lesions were first noted by the patient was 1.88 years in 116 cases (Napier and Das Gupta, 1930). This included many patients who did not notice the lesions until they were well advanced. Of these patients 15 per cent. noticed them within the first year and 88 per cent. within the first 3 years. In one case they appeared as early as six months after treatment for the visceral condition had been discontinued, but this was the earliest. It should be mentioned that as far as can be ascertained from clinical histories only one crop of lesions appears; some develop more rapidly than others and are consequently noticed at an earlier date, and some remain as depigmented lesions whilst others go on to nodule formation. That is to say once the dermal infection is established the only extension that occurs is by direct extension of the lesions; there is no evidence that at this stage the infection is spread by the lymphatic system, or—with the exception of the possible instance quoted in the next note—by the blood stream.

(22) The reader is referred to two papers on the subject by Acton and Napier (1927) and Napier and Das Gupta (1930).

(23) A few instances of the spontaneous disappearance of the dermal lesions have come to our notice, though this is apparently not a common occurrence. Under treatment by antimony injections improvement occurs slowly, whatever stage the condition has reached. One argument in favour of the suggestion that spontaneous cure occurs frequently is the comparative rarity of advanced lesions (but we are using this observation as an argument in favour of another suggestion).

(24) The writers have referred above to two cases in which a second attack appeared to occur. One of these patients, at the time of her second attack, had very early—but quite typical—dermal lesions. The cure of the first visceral attack was brought about by the usual course of injections, but the patient was in the earliest stages of the disease—less than a month's illness was reported and the aldehyde and antimony tests were negative—so that it is possible that the visceral immunity response was never fully developed. In the two other cases (one was also reported by Brahmachari and Banerjea, 1929) in which visceral symptoms have relapsed subsequent to the appearance of the dermal lesions, the visceral infection was only presumed on the evidence of a blood culture and suggestive clinical symptoms. Though the presumption was probably correct it seems possible that in rare instances the parasites might find their way into the blood from a dermal source in the presence of some infection, such as typhoid or malaria, which causes a general large-mononuclear mobilization.

(25) History appears to give us fairly conclusive evidence on this point.

(26) We see cases at the Calcutta School at the rate of about 100 a year. Six cases were found in an unselected group of 120 persons who had undergone kala-azar treatment (Napier and Das Gupta, 1931) at our village treatment centre.

(27) During the sojourn of the Kala-azar Commission in Assam, a period of six years, only some 5 or 6 cases came to their notice. Most of the Assam cases reported have come from the Sylhet valley which from a geographical point of view is almost Bengal. This is, of course, not conclusive evidence that the condition is rare, but at least it suggests that it is far less common than in Bengal.

(28) This argument is based mainly, but not entirely, on analogy. The power of organisms to adapt themselves to new surroundings and eventually to lose their ability to re-adapt themselves rapidly to their old environment is a phenomenon common to both bacteria and protozoa. The probabilities are that leishmania was primarily an insect flagellate and that it has gradually adapted itself to live as a parasite of warm-blooded animals. It has been shown that the virus taken from a dermal leishmaniasis nodule will give rise to a nodular growth in a monkey (Knowles, Napier and Das Gupta, 1923) and that from this nodule a second nodule may be produced by self-inoculation. Admittedly

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undergoing an evolutionary change from visceral to dermal localization, not because of any inherent dermatotrophic tendency on the part of the parasite itself, but by its acquiring an impressed characteristic through its powers of adaptability to changed environment.

During a period of hyper-endemicity the source of infection is mainly the peripheral blood of kala-azar patients, but in hypo-endemic periods there is reason to suppose that the infection is "carried over" by means of persons suffering from a dermal infection(29); so that with the passing of each wave of hyper-endemicity the parasite will acquire more and more a "dermal tendency."

In Assam, where hitherto the disease has always exhibited an epidemic character(30) and where in most areas of its activity it completely disappears in the inter-epidemic periods, the parasite has not travelled so far along the road of evolutionary development as its brother in Bengal, and dermal lesions are as yet uncommon.

Epidemiology.

We have considered the case separately from the point of view of host resistance and of parasitic variability; it can however be viewed as one process in which with the rising of the host immunity the parasite acquires a "dermal tendency," each process aiding the other in an evolutionary movement towards symbiosis.

Let us consider the state of affairs during the rise and decline of an epidemic in Assam and of a period of hyper-endemicity in Bengal.

Assam.—It is, let us say, 15 years since the last epidemic finished; a new generation of children has grown up. Those who were under the age of three years 15 years ago, and therefore probably escaped infection in the last epidemic, are now 18 years old; thus, practically none of the children have ever passed through an epidemic. Children of all ages, beyond the age of three(31), are more susceptible than adults and the most susceptible age period is 10 to 12 years(32). Thus, a population of non-immunes has been introduced(33). A concatenation of climatic events brings about a condition highly favourable to transmission and in a country where malaria is endemic all that is necessary is the introduction of a few cases of kala-azar for an epidemic to occur which will pass rapidly from village to village(34). The children form the bulk of the victims, but with the rise of the intensity of the epidemic others, normally more immune(35), are involved. The epidemic subsides with the exhaustion of the more highly susceptible material.

Bengal.—Assuming similar conditions with regard to the population, the transmitting agency, the secondary factor—malaria—and the climate, here the source of infection is widespread, in the form of patients with dermal lesions(36); these supply parasites which in highly susceptibles will give rise to the visceral

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a culture taken from this growth, injected intraperitoneally, can still give rise to a visceral infection in a mouse; one would not expect the strain to lose its power of reversion so rapidly. Again Young and Hertig (1927) had a Tunisian strain of *L. donovani* (from a case of infantile kala-azar) which when injected intraperitoneally repeatedly produced nodular dermal lesions in hamsters. A point which we are now endeavouring to investigate is whether, by experiments on monkeys after repeated sub-transplantations, a strain will show a greater tendency to assume a dermal than a visceral localization.

For analogy amongst bacteria we have the observations of Rosenow (1914 and 1923) and his co-workers who have shown that streptococci recovered, respectively, from rheumatic joints, sore throats, endocarditis, etc., when injected into experimental animals tend to become localized in joints, throats, endocardia, etc., respectively. Whilst using Rosenow's observations regarding the powers of organisms to show selective localization it is not necessary to accept his hypothesis *in toto*.

(29) The workers at the School of Tropical Medicine have shown that sandflies can be infected by feeding on dermal lesions, not only from the nodules, as was also shown by Shortt, d'Silva and Swaminath (1928), but from the depigmented areas. The senior writer (Napier and Das Gupta, 1931) has put forward the suggestion that the dermal-leishmaniasis patients, who constitute an appreciable percentage of the population in an endemic area, are responsible for the supply of virus during the periods of hypo-endemicity. If the sandfly is accepted as the transmitter, the suggestion is a feasible one and fits in with certain epidemiological observations. It is discussed a little more fully in the above-mentioned paper.

(30) McCombie Young (1924) demonstrated this very clearly. More recently, the members of the Kala-azar Commission found that the disease was so rare in Gauhati and the surrounding country—a few years previously a heavily infected area—that they considered it advisable to abandon this locality as the headquarters of the enquiry; furthermore, they could find no other suitable site in Assam.

(31) Though children below the age of 3 years do suffer from the disease, they are relatively no more susceptible than adults.

(32) The periods of highest incidence are 8 to 10 years in female and 10 to 12 years in male children (Napier and Das Gupta, 1931).

(33) The reader is referred to the experimental epidemiological work of Topley (1926) and others. They have shown that in a closed community where an epidemic dies down it can be resuscitated by the introduction of a new non-immune population and that the victims of the resuscitated epidemic will include a number of individuals who had escaped infection in the last epidemic.

(34) This was the characteristic of the method of extension of the early epidemics as reported by Rogers (1910), and more recently by all workers, such as McCombie Young (1924), who have investigated the epidemiology of the disease in Assam.

(35) We (Napier and Das Gupta, 1931) were able to show that in the most heavily infected village the incidence amongst adults was relatively greater than in the general population. The age distribution in Assam is much the same as in Bengal, but during the height of the epidemics it is reported that whole families were wiped out, and McCombie Young (1924) reports an incidence as high as 54 per cent. in some villages.

(36) We (Napier and Das Gupta, 1931) were able to show that 5 per cent. of the treated population suffered from recognizable dermal lesions: we have

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disease but which exhibit a tendency to produce dermal lesions in the slightly more immune. Thus, though at the beginning of the hyper-endemic period both visceral and dermal types will be encountered, as the visceral infections develop more rapidly and are a more prolific source of virus, there may be a period of reversion during which there is a temporary increase in the proportion of visceral types, some strains of leishmania losing their "dermal tendency." Later, however, as the dermal types—which are far more chronic—develop, and the more immune host population becomes involved, dermal types will again regain their predominance(37).

Eventually, with the passing of each "epidemic" wave, both in Bengal and Assam, the clinical picture of leishmania infection will gradually undergo a change from the visceral to the dermal manifestations.

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suggested in this paper that dermal infection is even more common than this.

(37) The hyper-endemic wave of kala-azar in Bengal probably reached its mode about the years 1922-23. The first case of dermal leishmaniasis to be recognized in Bengal was reported in 1922 by Brahmachari; the next year Knowles, Napier and Das Gupta (1923) reported a second case, but, despite the fact that we were thus familiar with the condition and on the look out for more cases, only a very few were seen up to the year 1925; from this time onwards there has apparently been a steady increase in the incidence of this condition. We say "apparently" because it is just possible that the cases may have existed unrecognized, but it is difficult to understand how this could have occurred between the years 1922 and 1925 when, though familiar with the condition, we saw so few cases.

If we accept our out-patient records at their face value, they indicate that in Bengal with the decrease in kala-azar incidence there has been a steady increase in the incidence of dermal leishmaniasis.

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MUTATION OF CHOLERA-LIKE VIBRIOS UNDER THE ACTION OF BACTERIOPHAGE.

(LYSABILITY OF CHOLERA-LIKE VIBRIOS BY PURE-LINE RACES OF CHOLERA BACTERIOPHAGE AND CHANGES INDUCED IN THE SEROLOGICAL REACTIONS OF CHOLERA-LIKE VIBRIOS UNDER THE INFLUENCE OF BACTERIOPHAGE.)

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Introduction.—Koch in 1883 isolated the cholera vibrio from cholera patients in Calcutta. Finkler and Prior (1884) and Deneke (1885) described vibrios resembling Koch's vibrio that had been isolated from non-choleraic material. In the twelve years following the discovery of the cholera vibrio, Metchnikof, Sanarelli, Gunter, Foker and other workers isolated vibrios indistinguishable morphologically from Koch's vibrios from water supplies of places where cholera existed, or had recently occurred. Several tests were devised to differentiate the vibrio isolated from cholera patients and from the vibrios isolated from other sources. The cholera-red reaction, the character and rate of gelatin liquefaction, the hæmolytic reaction, the pathogenicity for laboratory animals were each in turn held to differentiate the true cholera vibrio from the cholera-like vibrio, till it was realised that the cholera vibrio exhibits such variability in its biological characters that it was difficult to assess the importance that could be attached to these tests. Haffkine and Simpson (1895) carefully reviewed the previous literature bearing on the occurrence of vibrios in water, recorded their own findings of vibrios in water in India, and expressed the opinion that there appeared to be no water "commas" except those connected with cholera, varying as they found them in their morphological, physiological and biological characters. In 1896 agglutination, as a means of differentiation of the cholera vibrio from the cholera-like vibrios, was first used by Achard and Bensaude (1896). From then it was found that non-agglutinating vibrios could be isolated from cholera patients who were also passing agglutinating vibrios and that at times non-agglutinating vibrios only could be isolated in cases indistinguishable clinically from true cholera. These non-agglutinating vibrios on the analogy of the paratyphoid bacilli were grouped as paracholera vibrios (Mackie, 1922). Many such strains isolated from the stools of cholera convalescents, cholera contacts and healthy persons, and from natural waters, in diarrhœal and isolated choleraic outbreaks (Mackie and Stover, 1918) have been extensively studied and recorded. Greig (1917), Mackie (1922) and other workers found that the non-agglutinating cholera-like vibrios do not constitute a serologically homogeneous group. Several serological types, with certain types represented by single strains only, have been described.

Both the true cholera vibrio and the cholera-like vibrio (in this last category are included the paracholera vibrios) exhibit great variability in their biological characters. Their morphological appearances, both macroscopically and microscopically, are almost identical. The hæmolytic reactions of the two groups of vibrios are equally varied, particularly if we include the El Tor vibrio amongst the true or agglutinating vibrios. The only differentiation test of any value is the serological reaction, *i.e.*, its power to be agglutinated by a high titre serum prepared from a known cholera strain and this has become the universally recognised test for the identity of the true cholera vibrio.

Just as the biological characters of cholera vibrio are known to vary considerably, so have many writers claimed that a typical cholera vibrio may lose its serological characters, and conversely a non-agglutinating vibrio may acquire the property of agglutination by cholera high-titre serum. Bordet (1896) first reported non-agglutinability of a cholera vibrio as a result of animal passage. Zlatogoroff (1908) by alternate daily cultivations at body heat and cold storage succeeded in converting 18 strains of non-agglutinating vibrios that had been isolated from water into vibrios agglutinating with a cholera high-titre serum. McLaughlin and Whitmore (1910) repeated Zlatogoroff's experiments but failed to confirm his work. Carapelle (1912) succeeded in obtaining agglutinating vibrios from originally non-agglutinating vibrios by animal passage, thus confirming Bordet's observation. Puntoni (1913) by the use of earth and water media was able to obtain non-agglutinating vibrios from agglutinating vibrios and this experiment was repeated by Tomb and Maitra (1927) under natural conditions by placing in a tank, known to be free from vibrios and carefully guarded from outside infection, a cholera stool containing agglutinating vibrios and some hours later isolating non-agglutinating vibrios from the water of this tank. They (Tomb and Maitra) repeated the above experiment but instead of using a cholera stool they infected a tank with a culture of cholera vibrio and after a few hours isolated non-agglutinating vibrios from the water of the tank. Contacuzene (1925) obtained non-agglutinating vibrios from agglutinating vibrios by growing them in contact with immunised tissue. Douglas (1921) reported that after repeated subculture his vibrio, "paracholera A" acquired the property of agglutinating with cholera type serum. Greig (1916) injected a rabbit with a non-agglutinating vibrio and recovered an agglutinating vibrio from its gall bladder. This experiment Tomb and Maitra (1927)

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repeated and obtained a partially agglutinating vibrio from the rabbit's gall bladder. Brahmachari (1927) isolated non-agglutinating vibrios from the stool of a rabbit receiving agglutinating vibrios intravenously. He also reports the development of agglutinability by subculture alone, in 37 out of 68 non-agglutinating strains under examination during a period of 7 months. Toyoshima (1919) cultivated non-agglutinating vibrios in cholera high-titre serum and obtained agglutinating vibrios, and this acquired property was maintained in subsequent subcultures. He was able to convert non-agglutinating vibrios into agglutinating ones by growing in the filtrate of a cholera stool. d'Herelle (1927) is of the opinion that non-virulent non-agglutinating vibrios may be mutation forms of the virulent agglutinating vibrios, but does not think that the reverse change to virulence and agglutinability is possible.

Although a mass of literature has accumulated on the subject of serological variation of vibrios, either spontaneously by subculture alone, or under experimental conditions, the belief is so deeply rooted in the minds of the bacteriologists as to the impossibility of any change occurring in the specific serological reactions that Kolle and Prigg (1928) emphatically deny either the possibility of the loss of agglutination of a cholera vibrio or that the transformation of a non-agglutinating vibrio to an agglutinating vibrio can ever take place. They say that such observations are due either to errors in technique or are the result of uncritical investigation and are established on purely theoretical grounds. They suggest that all these apparent transformations are due to the peptone-water-enrichment method generally employed for the isolation of vibrios; this allows the few cholera-like vibrios of no ætiological importance present in the stool to multiply and overgrow the agglutinating cholera vibrios.

Scope of the present work and the technique employed.

Many of the experiments devised to alter the serological characters of a vibrio have been open to the criticism that either the original cultures were not pure or there was a possibility of contamination during the course of the experiment. The nature of the experiments were such that they did not yield uniform and convincing results. At the outset we realised that one of the most important elements a vibrio is likely to encounter and be influenced by in its natural life is its own parasite, the bacteriophage. We first tried the effect of cholera 'phage on the vibrio. On the true cholera vibrio the change is profound, and non-agglutinating colonies can easily be isolated. In this paper we shall only discuss the change in the serological reactions of non-agglutinating vibrios under the influence of bacteriophage.

The bacteriophages used were pure-line cholera 'phages derived from races received from Dr. I. N. Asheshov. These bacteriophages had been subjected to many transfers on true cholera vibrio. We tested the lysability by cholera 'phage of 355 strains of non-agglutinating vibrios isolated in Calcutta during the years 1929 and 1930; these vibrios were obtained from the stools of convalescent cholera cases and healthy persons, and from river and tank waters; they had undergone ordinary subculture in the laboratory. Each strain was first tested for its purity by plating, microscopic examination and sugar fermentation, and many of the strains were also examined for the presence of any contaminating bacteriophage. A vibrio known to be lysable by two types of cholera 'phage was acted upon by these two types in separate broth tubes and the filtrates, after further enrichment of the bacteriophage by growth on an ultra-pure cholera vibrio, were tested for the type of cholera bacteriophages present in them. If the vibrio was lysable by only one type of bacteriophage, it was lysed by that type, and to the lysed emulsion a young culture of a susceptible ultra-pure cholera vibrio was added. After incubation overnight the filtrate was again tested for the type of cholera bacteriophage in it. Strains of vibrios which could not be lysed by cholera 'phage were grown in broth together with a known cholera vibrio and after incubation overnight the filtrate was tested for the presence of any bacteriophage.

The lysability of vibrios by cholera 'phage was tested on pepsin agar (1.1 per cent.). The plate was spread with a young peptone-water culture of the vibrio, allowed to dry in the incubator and small loopfuls of each type of undiluted 'phage were then placed in marked squares and the result read after incubation overnight. Only definite clear-cut results were recorded. Many strains were also tested in liquid media and the degree of lysis under 'phage action noted. With some vibrios an almost complete lysis was obtained. It may be noted here that some strains of vibrios which were almost completely lysed by bacteriophage, failed to propagate the bacteriophage so that in a few transfers the 'phage died out completely.

Agglutination test.—Dreyer's technique was employed throughout, using formalinised cultures. The tubes were kept in the water-bath for 4 hours, and then in the room overnight. Readings were made with the aid of a lens but the "standard" degree of agglutination only was recorded.

Agglutinin-absorption test.—Formalinised emulsions of agar-grown cultures were used and an estimated absorption dose employed in each experiment. Agglutination tests were performed simultaneously with the absorbed and unabsorbed sera and if, for any reason, any part of the test required to be repeated, the whole test was done again.

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Lysability of non-agglutinating vibrios by pure-line races of cholera 'phage.

Certain strains of non-agglutinating vibrios isolated from non-choleraic material were found to be lysed by cholera 'phage, and in some experiments the 'phage-resistant colonies that developed in the area of 'phage action were agglutinable to the full dilution of a cholera type serum. We then examined our collection of non-agglutinating vibrios for lysability by cholera 'phage. A preliminary agglutination test was done with each strain, using a cholera high-titre serum prepared in the laboratory by inoculation of five recently-isolated ultra-pure cholera vibrios. This serum agglutinated typical cholera vibrios in dilutions of 1 in 12,000. Some strains which on isolation were not agglutinated by cholera high-titre serum were now found to be agglutinable in varying dilutions of the cholera serum, and are not included in our series of non-agglutinating vibrios. It may be noted here that the strains which had developed partial agglutinability by subculture alone, if lysable by cholera 'phage, gave rise after 'phage action to secondary colonies which were agglutinated in much higher dilutions of the cholera serum than the original cultures. Strains of vibrios which were inagglutinable in dilutions of 1 in 100 of cholera high-titre serum were examined for lysability by cholera 'phage. The lysis was tested on solid media and only definite clear-cut results recorded. The number of strains examined and the percentage lysable by different types of cholera 'phage are shown in table I.

patients by the "open-bowl" method were not lysed by cholera 'phage in any of our experiments. This group was again subjected to a careful scrutiny and the vibrios were found to be all typical mono-flagellates giving the sugar reaction of cholera vibrio. Many of these strains were contaminated with cholera 'phage type A. It is possible that the mutation in this group is of a more advanced nature. If we exclude this group of vibrios isolated from cholera stools by the open-bowl method, we get a higher percentage, *i.e.*, 30 per cent. of the non-agglutinating vibrios that are lysable by cholera 'phage types B and C.

Vibrios isolated from waters and from individuals not suffering from cholera were found to be free from any contaminating cholera bacteriophage.

Effect on the serological reactions of non-agglutinating vibrios after subjection to the action of cholera bacteriophage.

If we spread a young culture of a non-agglutinating vibrio known to be lysable by cholera 'phage and, after allowing it to dry in the incubator, put a drop of cholera 'phage on the smear, next morning we find that there is a clear-cut area of 'phage action in the bacterial growth with a few 'phage-resistant colonies that have developed in it. With some strains of vibrios the colonies that develop in this area of 'phage action are found to be agglutinable at the highest dilution of a standard cholera serum. We found some difficulty in maintaining this acquired property of agglutinability which we

TABLE I.

Lysability of 365 strains of non-agglutinating vibrios by different types of cholera 'phage.

Source.	Number of strains tested.	Lysed by cholera 'phage of				Lysed by cholera 'phage. Percentage.
		Type A only.	Type B only.	Type C only.	Types B and C.	
River and tank waters (Calcutta) ..	88	..	2	26	18	52
Healthy persons	82	..	..	..	13	16
Convalescent cholera cases ..	126	..	8	12	4	19
Cholera stools examined by the open-bowl method.	59	..	..	..	..	..
TOTAL ..	355	..	10	38	35	23

1. Cholera 'phage type A, the quickest-acting type of cholera bacteriophage—which lyses only the smooth forms of cholera vibrio—does not lyse any non-agglutinating strain, in spite of the fact that many of the non-agglutinating strains gave the Millon's test for smooth cultures.

2. Cholera 'phages of the types B and C either acting singly or together cause lysis of 23 per cent. of this series. The non-agglutinating vibrios isolated from the stools of cholera

will discuss later. We performed several control experiments using killed cultures of vibrios mixed with bacteriophage, vibrios grown in the presence of cholera 'phage which had no lytic action on them, and killed bacteriophages added to emulsions of vibrios, but could demonstrate no change in the serological reactions.

Two strains of non-agglutinating vibrios, one isolated from the stool of a convalescent cholera patient and under laboratory culture for over a year, and the other recently isolated

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from the water of a tank were studied in great detail. The changes in the serological reactions of these two strains under the action of cholera 'phage are given below as typical examples of the changes that occurred with several other strains.

Strain No. 1.—Vibrio 817 NAG isolated on 13th September, 1929, from the stool of a convalescent cholera patient. It was a typical mono-flagellate, Gram-negative vibrio, non-hæmolytic to sheep and human red blood cells, gave a well-marked cholera-red reaction, fermented without gas production glucose, saccharose, maltose, and mannite, and gave the Millon's reaction for pure rough cultures. It was free from any contaminating bacteriophage. This strain was non-agglutinating on isolation and had been subcultured several times on ordinary laboratory medium. It was plated out in August, 1930 and its original characters confirmed. In February, 1931, *i.e.*, sixteen months after the isolation a high-titre serum was prepared with it; this agglutinated the homologous strain in a dilution of 1 in 6,000, but did not agglutinate any of the 25 other strains of typical cholera vibrio tested by us. Cholera 'phage types B and C gave very good clearings in the bacterial film and the secondary colonies were agglutinable to the full dilution of the cholera high-titre serum. This acquired agglutinability of the secondary colonies was unimpaired after 13 subcultures on ordinary agar. Sera were prepared afresh, by inoculation of the original non-agglutinating culture and the secondary 'phage-resistant culture. Agglutination and agglutinin absorption experiments were perfomed. The serological variations induced by bacteriophage action and the various control experiments performed are summarised below:—

TABLE II.

Agglutination experiments with the original strain vibrio 817 NAG and the secondary colonies that developed after the action of bacteriophage on the original strain.

Cultures.	Agglutination test made with cholera high-titre Serum (Kasauli) titre 1 in 8,000.
Original strain vibrio 817 ..	Non-agglutinating.
50 colonies isolated from original strain 817.	All non-agglutinating.
Bacteriophage-resistant colonies after cholera 'phage type B action on vibrio 817.	Agglutinating 1 in 4,000.
Bacteriophage-resistant colonies after cholera 'phage type C action on vibrio 817.	Agglutinating 1 in 8,000.
Bacteriophage-resistant colonies after cholera 'phage types B and C action on vibrio 817.	Agglutinating 1 in 8,000.

TABLE III.

Experiments showing that the mere presence of bacteriophage is not responsible for the change in serological reaction.

Cultures.	Agglutination test made with cholera high-titre Serum (Kasauli) titre 1 in 8,000.
Original culture vibrio 817 NAG not lysed but grown in contact with an equal number of corpuscles of cholera 'phage type A.	Non-agglutinating.
Dead (carbolised) original culture of vibrio 817 with cholera 'phage types B and C added.	Do.
Dead (formalinised) original culture of vibrio 817 with cholera 'phage types B and C added.	Do.
Heat-killed original culture of vibrio 817 with cholera 'phage types B and C added.	Do.
Original culture of vibrio 817 mixed with killed bacteriophage.	Do.

Agglutinin absorption experiments.

Sera prepared with the original non-agglutinating vibrio 817 the agglutinating secondary culture of vibrio 817, and the cholera high-titre serum (Kasauli) were each absorbed by cholera vibrio (vibrio 684), by the original vibrio 817, and by the secondary growth of vibrio 817. The absorbing dose in each case was 50×10^{10} vibrios per c.cm. of the high-titre serum.

TABLE IV.

Agglutination tests using unabsorbed and absorbed cholera high-titre serum (Kasauli).

Cholera high-titre serum (Kasauli).	Agglutination with		
	Cholera vibrio 684.	Original vibrio 817.	Secondary culture of vibrio 817.
Unabsorbed serum (titre 1 in 5,000).	1 in 5,000	Nil.	1 in 5,000.
Absorbed by cholera vibrio 684.	Nil.	Nil.	Nil.
Absorbed by original vibrio 817 (non-agglutinating).	1 in 5,000	Nil.	1 in 5,000.
Absorbed by secondary culture after 'phage action on vibrio 817.	Nil.	Nil.	Nil.

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TABLE V.

Agglutination tests using serum prepared with the original culture of vibrio 817 *(non-agglutinating).*

Serum prepared from the original culture of vibrio 817.	AGGLUTINATION WITH		
	Cholera vibrio 684.	Original vibrio 817.	Secondary culture of vibrio 817.
Unabsorbed serum.	Nil.	1 in 2,000.	1 in 2,000.
Absorbed by cholera vibrio 684.	Nil.	1 in 2,000	1 in 2,000.
Absorbed by original culture vibrio 817.	Nil.	Nil.	Nil.
Absorbed by secondary culture after 'phage action on vibrio 817.	Nil.	1 in 250	Nil.

TABLE VI.

Agglutination tests using serum prepared from the secondary culture after cholera 'phage action on vibrio 817.

Serum prepared from the secondary culture after 'phage action on vibrio 817.	AGGLUTINATION WITH		
	Cholera vibrio 684.	Original vibrio 817.	Secondary culture of vibrio 817.
Unabsorbed serum.	1 in 2,500	1 in 1,000	1 in 5,000.
Absorbed by cholera vibrio 684.	Nil.	1 in 1,000	1 in 2,000
Absorbed by original culture vibrio 817.	1 in 2,500	Nil.	1 in 1,500
Absorbed by secondary culture after 'phage action on vibrio 817.	Nil.	Nil.	Nil.

1. The strain vibrio 817 isolated from a stool of a convalescent cholera patient and which had been subcultured several times in the course of a year must be regarded as a true non-agglutinating strain. The original strain and several isolated colonies obtained by the dilution method were not agglutinated by the cholera high-titre serum. A serum prepared with the original strain does not agglutinate any of the 25 strains of true cholera vibrio and cholera vibrio does not remove any agglutinins from this serum.

2. The thirteenth subculture of the 'phage-resistant secondary colonies that developed after the action of cholera bacteriophage on vibrio 817 is agglutinable in very high dilutions of cholera type serum and completely absorbs the agglutinins from the cholera serum. A serum prepared with this secondary culture agglutinates typical cholera vibrio, and cholera vibrio removes the agglutinins from this serum. This culture which developed after the action of cholera 'phage on the original non-agglutinating strain is serologically related to the cholera vibrio.

3. The secondary culture is not wholly of the agglutinating type. It possesses agglutinogenic power for the original strain. The high-titre serum prepared with it contains two types of agglutinins, one type that is removed by the original non-agglutinating culture and the other type removed by cholera vibrio without effecting any reduction of the other type of agglutinins.

Strain No. 2.—Water vibrio 693 NAG isolated on 26th October, 1930, from the water of College Square Tank. It was a typical monoflagellate Gram-negative vibrio, slightly hæmolytic to sheep's red blood cells, non-hæmolytic to human red blood cells, gave a well-marked cholera-red reaction, produced acid without gas formation in glucose, saccharose, maltose, and mannite, gave Millon's test for a pure smooth culture, and was free from any contaminating bacteriophage. It was non-agglutinating on isolation and remained inagglutinable after several subcultures. Cholera 'phages types B and C gave very good clearings in the bacterial film and the secondary colonies that developed in the area of 'phage action were readily agglutinated by cholera high-titre serum.

High-titre sera were prepared against the original culture and the secondary growth. The agglutination tests that were performed together with various control experiments are summarised below:—

TABLE VII.

Agglutination experiments with the original strain water vibrio 693, *and the secondary culture after the action of cholera 'phage types B and C on the original strain.*

Culture.	Agglutination tests with cholera in high-titre serum (Kasauli) titre 1 in 8,000.
Original strain water vibrio 693.	Non-agglutinating.
50 colonies isolated from the original strain water vibrio 693.	All non-agglutinating.
Bacteriophage-resistant colonies after cholera 'phage type B action on water vibrio 693.	Agglutinating 1 in 2,000.
Bacteriophage-resistant colonies after cholera 'phage type C action on water vibrio 693.	Agglutinating 1 in 4,000.
Bacteriophage-resistant colonies after cholera 'phage types B and C action on water vibrio 693.	Agglutinating 1 in 8,000.

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TABLE VIII.

Experiments showing that the mere presence of bacteriophage is not responsible for the change in serological reactions.

Cultures.	Agglutination tests made with cholera high-titre serum (Kasauli) titre 1 in 8,000.
Original culture of water vibrio 693 not lysed but grown in contact with an equal number of corpuscles of cholera 'phage type A.	Non-agglutinating.
Dead (carbolised) original culture of water vibrio 693 with cholera 'phage types B and C added.	Do.
Dead (formalinised) original culture of water vibrio 693 with cholera 'phage types B and C added.	Do.
Heat-killed original culture of water vibrio 693 with cholera 'phage types B and C added.	Do.
Original culture of water vibrio 693 mixed with killed bacteriophage.	Do.

TABLE IX.

Cross agglutination tests using standard cholera serum, the serum prepared with the original culture of water vibrio 693 *and the serum prepared with the secondary culture after 'phage action on water vibrio* 693.

Serum.	Agglutination with		
	Typical cholera strain (vibrio 684).	Water vibrio 693. NAG.	Secondary culture after 'phage action on water vibrio 693.
Cholera high-titre serum (Kasauli).	1 in 5,000	Nil.	1 in 5,000.
Serum prepared with the original water vibrio 693.	Nil.	1 in 12,000.	1 in 4,000.
Serum prepared with the secondary culture of vibrio 693 after 'phage action on it.	1 in 4,000	1 in 500	1 in 8,000.

The strain water vibrio 693, like vibrio 817, is not agglutinable by a standard cholera serum and possesses no antigenic power for cholera vibrio. The secondary growth that develops after 'phage action is agglutinable by a cholera high-titre serum and possesses agglutinogenic properties for cholera vibrio.

Stability of the agglutinability of the secondary cultures that develop after the action of cholera 'phage on non-agglutinating vibrios.

The secondary 'phage-resistant colonies that develop in an area of bacteriophage action on cholera-like vibrios were in many experiments readily agglutinable by a cholera high-titre serum, but we experienced great difficulty in maintaining this acquired agglutinability on subculture. In some experiments the agglutinability was maintained, while in other experiments this acquired property was lost on subculture and the results were extremely variable and inconclusive. Subcultures made in the presence of bacteriophage, both in liquid and solid media, repeated quick transfer from one medium to another, and in medium inhibitory to the growth of bacteriophage, all these different conditions were equally uncertain in maintaining the agglutinability of the secondary cultures. We then plated out the first culture made from the secondary colonies and obtained colonies varying from non-agglutinating to fully agglutinable ones. The best agglutinating colonies were picked up and after repeating this process of isolation several times we obtained cultures more stable in their agglutinability, whether these agglutinating colonies freed from the non-agglutinating elements which existed in the secondary culture, contain any agglutinogenic properties for the original culture is still under investigation.

Preliminary studies of vibrios not lysable by cholera 'phage.

Many attempts were made to render the non-lysable cholera-like vibrios susceptible to 'phage action. Different races of bacteriophage were employed and experiments made to adapt the cholera 'phage to the non-lysable vibrios without any success. The experiments of adaptation are still in progress. We tried to increase the sensitivity of the vibrio to 'phage action by growth in a series of tubes of peptone water of increasing alkalinity. Several strains of cholera-like vibrios that were not lysable by cholera 'phage were passed through alkaline medium. The details of one strain which became lysable after preliminary growth in alkaline medium is given below:—

Strain—water vibrio 785, isolated on the 7th May, 1931, from the river Hooghly in Calcutta, was a typical cholera-like vibrio, smooth, not agglutinated by cholera high-titre serum and not lysable by cholera bacteriophage. A series of peptone-water tubes of increasing degrees of alkalinity were inoculated and the strain gradually trained to grow in tubes of high

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alkalinity. Susceptibility to bacteriophage action was tested from time to time and it was found that after two weeks growth in alkaline medium the vibrio had become lysable by cholera 'phage and the secondary colonies that appeared in the 'phage-acted area were agglutinable by cholera high-titre serum.

The origin of the bacteriophage-resistant agglutinating colonies that develop after bacteriophage action on non-agglutinating vibrios.

It might be suggested that the agglutinability of the secondary colonies that develop after cholera 'phage action on cholera-like vibrios was due to the presence of dissolved particles of Koch's vibrio present in the bacteriophage used, or to the mere presence of bacteriophage. This latter suggestion can be disproved by the many control experiments cited above and repeated under many varying conditions. The possibility of the dissolved particles of Koch's vibrio in the bacteriophage being the cause of the agglutinability of the secondary cultures or acting as antigens was eliminated by repeating the experiments employing races of bacteriophage that had suffered several serial transfers on non-agglutinating vibrio culture. The change in serological reaction might be due to some alteration in the character of the vibrio after infection by bacteriophage, and this is the explanation advanced by d'Herelle on the origin of secondary growths. It might be due to the wholesale destruction of vibrios with survival and growth of the pre-existing 'phage-resistant vibrios which were present in very small numbers in the original culture. Were it possible to isolate and examine many thousands of colonies, we might have encountered an agglutinating colony in our original culture. Or were we to examine a non-agglutinating culture which we have reason to believe contains a large number of agglutinating vibrios, we would find it comparatively easy to separate these different serological variations. Bacteriophage *per se* has no effect on agglutinability but undoubtedly has very great selective destructive and protective action on the population that goes to make an ordinary culture. The following experiment illustrates the serological variability in a culture which on isolation was not agglutinated by cholera high-titre serum.

Cholera case 1191.—Five normal looking colonies isolated from the original plate inoculated with a stool without previous peptone-water enhancement from case 1191, clinically cholera.

Colony V in table X which was a rough, non-agglutinating, non-lysable colony isolated from the original plating of a cholera stool, was plated out and the isolated colonies from this plate were again plated out in order to study the character of the individual vibrios in the original colony V. The character of five colonies obtained from repeatedly plating out colony V are given below:—

TABLE X.

Colony.	Agglutination with cholera high-titre serum.	Millon's test.	Lysability by laboratory cultures of bacteriophage.	Lysability by cholera 'phage present in the stool filtrate.
I	1 in 4,000	Smooth	Lysed by types A, B and C.	Completely lysed.*
II	1 in 4,000	Rough	Lysed by types B and C.	Not lysable.
III	1 in 2,000	Smooth	Not lysable	Not lysable.
IV	Nil.	Smooth	Lysed by type B only.	Not lysable.
V	Nil.	Rough	Not lysable	Not lysable.

* The secondary colonies that developed after the action of the bacteriophage in the stool on these ultra-pure vibrios varied from non-agglutinable to feebly agglutinable ones.

TABLE XI.

Colony.	Agglutination with cholera high-titre serum.	Millon's reaction.	Lysability by laboratory cultures of cholera 'phage.	Lysability by cholera 'phage present in the original stool filtrate.
V. A.	Nil.	Rough	Not lysable	Not lysable.
V. B.	4,000	Rough	Lysed by types B and C.	Not lysable.
V. C.	4,000	Smooth	Lysed by types A, B and C.	Completely lysed.*
V. D.	1,000	Rough Smooth	Lysed by type C.	Not lysable.
V. E.	Nil.	Rough	Lysed by types B and C.	Not lysable.

* The secondary colonies that developed after the action of the bacteriophage in the stool on these ultra-pure vibrios varied from non-agglutinable to feebly agglutinable ones.

The chief facts to be noted are:—

(*i*) Isolated colonies from the direct plating of a cholera stool may be variable in their agglutinability by cholera high-titre serum and in their lysability both by laboratory cultures of cholera bacteriophage and the bacteriophage present in the stool filtrate. This escape of certain vibrios from infection by bacteriophage in the intestine must be due to some barrier, either there is a protective layer of mucus, or the vibrio is surrounded by its own progeny which form an efficient barrier against the penetration of bacteriophage to the parent vibrio. The secondary growths, that develop after the action of the bacteriophage present

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in the stool on the agglutinating and 'phage-sensitive ultra-pure vibrios isolated from the stool, are variable in their agglutinability. Non-agglutinating colonies may be isolated from such ultra-pure vibrios by the action of freshly-isolated bacteriophage, whereas in the secondary colonies that develop after the action of laboratory cultures of bacteriophage on freshly-isolated cholera vibrio or on laboratory strains, serological mutations cannot be readily demonstrated. The freshly-isolated bacteriophage is better suited than old laboratory cultures of bacteriophage to convert the agglutinating and virulent vibrios into the non-agglutinating and avirulent varieties. This observation which will be more fully dealt in another communication is of great importance in the study of the changes that an agglutinating vibrio undergoes in nature under the influence of bacteriophage. The failure of any change in agglutinability under the influence of laboratory cultures of bacteriophage, also stresses the importance of using fresh and recently-isolated races of bacteriophage in preference to old cultures in the treatment and prophylaxis of disease.

(*ii*) By a process of plating and replating an isolated colony of vibrios from an original stool plate, colonies variable in their serological reactions and bacteriophage sensitivity may be found. In the example given, an agglutinating colony was isolated by plating a colony that was inagglutinable.

This type of work has been open to the criticism that the colony was originally contaminated with non-agglutinating vibrios of no ætiological significance. This is a type of argument very hard to refute. Changes of this nature are difficult to observe in laboratory-fixed and artificial cultures, but comparatively easy if we study colonies from the original plate culture inoculated without previous peptone-water enhancement with a cholera stool. If this change has been initiated and has progressed to a certain degree in the intestine, the variability in the characters of the vibrios may be readily demonstrated. Laboratory cultures under extreme environmental conditions may also show variations in their characters and the following summary of an experiment illustrates that even in laboratory cultures variations in agglutinability and change of lysability by bacteriophage may occur.

Four strains of well-agglutinating vibrios, belonging to four smooth groups of vibrios classified according to the lytic action of cholera 'phage type A were cultured on agar and kept in the cold room for a period of seven months. On subculture at the end of this period we found that two of the strains were no longer agglutinable and a much lowered agglutinability in the other two strains. Bacteriophage sensitivity was also considerably altered. The details of one strain which is of particular interest is given below.

Vibrio 618, isolated in 1929, smooth and agglutinable to the full titre (1 in 8,000) with a cholera high-titre serum, producing a serum which agglutinated the homologous vibrio and cholera vibrio in dilutions of 1 in 12,000 was lysed by all kinds of type "A" cholera 'phage. After a stay of seven months in the cold room (about 32°F.) it was subcultured in May, 1931 and found to be no longer agglutinable by the standard cholera serum or by the serum prepared with the original strain. Cholera 'phage now had no action on it. Repeated quick transfers from one medium to another failed to restore its original characters. By plating this culture, colonies belonging to the original group I, colonies belonging to restricted type-A-sensitivity groups II and III, and colonies lysable only by types "B" and "C" were obtained. The agglutinability also varied, and both non-agglutinating colonies and colonies agglutinating as well as the original strain were found.

Bordet (1925) and Gratia (1921) and several workers hold that the secondary colonies that develop after the action of bacteriophage pre-exist as such in the original culture. d'Herelle is of the opinion that the secondary cultures are mutation forms resistant to the action of bacteriophage and which have acquired an hereditary immunity against that particular race of bacteriophage. As far as our work on the non-agglutinating vibrios shows, it is possible that both these views are correct. A very small proportion of vibrios in a culture which is non-agglutinating consist of either agglutinating vibrios or vibrios which readily become agglutinating, and which after undergoing an adaptation to bacteriophage persist as such in the secondary 'phage-resistant colonies.

Summary.

I. A series of 355 cholera-like vibrios isolated from waters and man in Calcutta were examined for lysability by ultra-pure races of cholera 'phage. Twenty per cent. of this series were found to be lysable by types B and C cholera 'phage. Cholera 'phage type A, the quickest-acting type of cholera 'phage, which acts only on smooth forms of vibrios, did not lyse any of these cholera-like vibrios in spite of the fact that many strains gave the Millon's test for pure smooth cultures.

II. Some of the strains non-lysable by bacteriophage could be rendered lysable by serial subculture on increasingly alkaline medium.

III. The secondary 'phage-resistant colonies that develop after the action of cholera bacteriophage on cholera-like vibrios, in some experiments are agglutinable by a cholera high-titre serum. They completely absorb the agglutinins from a cholera type-serum and produce a serum which agglutinates cholera vibrios in very high dilutions. This acquired

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agglutinability is difficult to maintain on subculture and requires repeated plating and selection of the best agglutinating colonies.

IV. The mere presence of bacteriophage is not responsible for this change in serological reaction.

V. Evidence is produced suggesting that the loss of agglutinability in a vibrio is a natural process that occurs in the body. From the vibrios undergoing this change it is comparatively easy to isolate typical agglutinating vibrios.

VI. There is some bacteriophage and serological relationship between the true cholera vibrio and the cholera-like vibrios. Although there are many vibrios that have no relationship with the true cholera vibrio, a large percentage of vibrios that are isolated in Nature in places where cholera exists, and that resemble the cholera vibrio in morphological and biological characters differing only in serological reactions, are mutation forms of the true cholera vibrio and undoubtedly play a great part in the ætiology of the disease.

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FURTHER NOTE ON ANTI-MALARIAL MEASURES ON THE TRAVANCORE TEA COMPANIES' ESTATES.

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THIS note is a further instalment on the anti-malarial work which is being carried out on the Travancore Tea Companies' estates in the Vandiperiyar Valley. Reference should be made to the previous paper on this subject (Clemesha and Moore, 1930). Those familiar with this paper will remember that careful anti-malarial measures, both anti-larval and anti-gametocyte, have been going on for a period of five years; the work still continues exactly on the same lines.

The present paper deals with the results obtained from blood slides of the fever sick. The orders are that in five estates, the names of which are given in the table, everybody who reports sick, complaining of fever, has a slide made from his blood before receiving treatment. These go to a central office, and are stained and examined. Table I gives a detailed account of every slide, month by month, and the malaria present. The table is divided into two halves for purposes of comparison; the non-malaria season which lasts from July to March, and the malaria season which is April, May and June.

In order to save a lengthy description, some interesting facts, concerning the year's working, have been tabulated at the foot of each column for each estate. Further, all cases of fever in new-comers to the estate are shown separately in the various columns within a square.

Table I, which gives all the details, does not require a great deal of discussion. General conclusions would be better obtained from table II, which is an abstract of table I.

The following points should be noted:—

Injikadu and Passamullay are now very healthy. The actual number of sick for the twelve months is small. In the year 1927 a complete colony of new lines was built in Injikadu, to replace some badly-situated ones and since that date there has been extremely little sickness. In Passamullay the line sites are extremely good and situated at a considerable altitude. Munjamullay is a large and scattered estate, and has one small division round the factory at the bottom of the valley close to the Periyar river. The malaria cases are obtained from this division. Concerning Nellikai it will be easy to understand that a dispensary situated right in the centre of the lines and a popular dispenser means that a larger number of coolies ask for medicine than would be the case if the dispensary were further away, or the dispenser not popular. The amount of malaria on Nellikai is no greater than on the other estates, but the number of people

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YEAR 1930-1931 (JULY 1st, 1930—JUNE 30th, 1931).

NON MALARIA SEASON

	MUNGIMALLAY								INJIKADU								NELLIKAI								TANGAMULLAY								PASSUMULLAY							
	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam
July	14	5	9	2	3			1	1	1		1					15	7	8	2	5			1	4	4		2	2			1	2	2	0				2	
August	14	10	4	4	6 [2]			3									8	4	4	2 [1]	2			1	19	2	17		2 [2]											
September	14	4	10	4 [1]					6	2	4	2					17	6	11	2	4				3	1	2	1												
October	4	1	3	1													5		5						4	1	3						3	1	2		1 [1]			1
November	4	3	1	2	1												24	12	12	9 [4]	1 [1]		2 [1]	5	2		2						2	1	1	1				
December	4	0	4														9	2	7	1 [1]	1 [1]			1	7	1	6		1		1									
January	2	0	2														9	2	7	2 [2]				2	5		5						1	0	1					
February	2	0	2														5	3	2	3					3	0	3													
March	2	1	1	1													5	0	5	0					13	7	6	4		2	1		1		1					
Total	60	24	36	14	10			4	7	3	4	3					97	36	61	21	13		2	10	60	16	44	7	5	2	2	1	9	4	5	1	1		2	1
		40%	60%	of all Slides						43%	57%	of all Slides						37%	63%	of all Slides						27%	73%	of all Slides						44%	56%	of all Slides				
				58%	42%	of all Positive Slides						100%	of all Positive Slides							58%	36%	6% of all Positive Slides						44%	31%	12%	12% of all Positive Slides					25%	25%	50% of all Positive Slides	
	3	Gam-17% of all Positive Slides															11	Gam. 28% of all Positive Slides							2	Gam. 6% of all Positive Slides							1	Gam. 25% of all Positive Slides						

MALARIA SEASON

	MUNGIMALLAY								INJIKADU								NELLIKAI								TANGAMULLAY								PASSUMULLAY							
	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam	Total Slides	+	−	BT	MT	Q	M	Gam
April	4	1	3	1													8	1	7	1 [1]					6	0	6								0					
May	13	10	3	5 [1]	3 [1]	1 [1]	1 [1]	2	2	0	2						19	11	8	7 [2]	4 [2]			3	7	4	3	3		1		1	1	1	0	1				
June	7	3	4	2			1 [1]	1	3	2	1	1 [1]		1 [1]		2	11	5	6	3 [2]	1		1 [1]		15	3	12	3					2	1	1	1				
Total	24	14	10	8	3	1	2	3	5	2	3	1		1		2	38	17	21	11	5		1	3	28	7	21	6		1		1	3	2	1	2				
		58%	42%	of all Slides						40%	60%	of all Slides						45%	55%	of all Slides						25%	75%	of all Slides						67%	33%	of all Slides				
				57%	22%	7%	14% of all Positive Slides					50%		50%	of all Positive Slides					65%	29%	6% of all Positive Slides						86%		14% of all Positive Slides						100%	of all Positive Slides		
	5	Gam-21% of all Positive Slides							2	Gam. 100% of all Positive Slides							13	Gam. 18% of all Positive Slides								Gam 14% of all positive Slides													
Gross Total	84	38	46	22	13	1	2	7	12	5	7	4		1		2	135	53	82	32	18		3	13	88	23	65	13	5	3	2	2	12	6	6	3	1		2	1

Population 800 mean 1931
Children 166
Deathrate per 1000 pop per annum 10
Average number of cases all causes requiring medicine per week 18.1
Per centage requiring treatment per week 2%

Population 400 mean 1931
Children 80
Deathrate per 1000 pop per annum 17.5
Average number of cases all causes requiring medicine per week 13.3
Percentage requiring treatment per week 4%

Population 475 mean 1931
Children 110
Deathrate per 1000 pop per annum 10.5
Average number of cases all causes requiring medicine per week 62.8
Percentage requiring treatment per week 13.%

Population 450 mean 1931
Children 75
Death rate per 1000 pop per annum 26.7
Average number of cases all causes requiring medicine per week 41.6
Per centage requiring treatment per week 9%

Population 550 mean 1931
Children 115
Death rate per 1000 pop per annum 10.9
Average number of cases all causes requiring medicine per week 59.2
Per centage requiring treatment per week 11%

Figures □ are New comers to the Estate

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asking for medicine from all causes is rather high.

Another point that should be noticed is that a party of new-comers on Nellikai accounted for a large number of cases; in the malaria season there were no less than 11 cases amongst the new-comers out of 36, and in the non-malaria season there were 13 out of 17. Manifestly, therefore, this party of coolies accounted for most of the true malaria on the estate.

Tangamullay is now in a fairly satisfactory condition as regards health.

Percentages worked out on about 20 slides only for the year are not very satisfactory, as is the case in Injikadu and Passamullay.

By far the most important point to notice in this table is that now there is no difference in the amount of malaria, between the malaria season and the non-malaria season. It must also be remembered that anti-larval measures were carried out very vigorously on all these estates, commencing in March and were continued up to the burst of the rains. The table demonstrates the serious results which occur from taking on groups of highly-infected new-comers without adequate precautions.

TABLE II.

Abstract of Table I.

Non-malaria season.

Estate.	Total slides.	+	—	Benign tertian.	Malignant tertian.	Quartan.	Mixed infections.	Gametocytes.
Munjamullay ..	60	24	36	14	10	..	..	4
Injikadu ..	7	3	4	3	..	..	..	..
Nellikai ..	97	36	61	21	13	..	2	10
Tangamullay ..	60	16	44	7	5	2	2	1
Passamullay ..	9	4	5	1	1	..	1	1
TOTAL ..	233	83	150	46	29	2	5	16
Percentage (of all slides) ..	..	35.6	64.4	..	..	..	..	..
Percentage (of positive slides)	..	..	..	55.4	34.9	2.4	6.1	19.3
Excluding 17 new-comers ..	216	66	(=30.5% of all slides)		..	..	..	..

Malaria season.

Estate.	Total slides.	+	—	Benign tertian.	Malignant tertian.	Quartan.	Mixed infections.	Gametocytes.
Munjamullay ..	24	14	10	8	3	1	2	3
Injikadu ..	5	2	3	1	1	..	..	2
Nellikai ..	38	17	21	11	5	..	1	3
Tangamullay ..	28	7	21	6	..	1	..	1
Passamullay ..	3	2	1	2	..	..	..	..
TOTAL ..	98	42	56	28	9	2	3	9
Percentage (of all slides) ..	..	43	57	..	..	..	..	..
Percentage (of positive slides)	..	..	..	66.6	21.4	4.4	7.6	21.4
Excluding 20 new-comers ..	78	22	(=28.2% of all slides)		..	..	..	..

Table II is an abstract of table I for the five estates. The table is self explanatory. The following points should be noticed:—(1) There is practically no difference in the amount of malaria between the malaria season and non-malaria season. Percentages of + slides, eliminating new-comers in both instances, is about 30 in the non-malaria season and 28 in the malaria season. Total number of slides in each case being 216 and 78, renders these figures fairly satisfactory. Throughout the whole year about one-third of the slides only showed parasites. (2) As would be expected, benign tertian greatly predominates, both in

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the malaria and non-malaria seasons. (3) There is very little quartan in any of these estates. (4) The number of mixed infection has declined very rapidly, probably on account of the after-treatment.

Table III is, however, the most important of this series. In this will be found figures that are given for six years, commencing 1926. In 1926 to 1927 the figures of the number of cases only refer to the malaria season. From July 1st, 1927, onwards regular figures, month by month, have been kept; recently every case

TABLE III.

Comparative statement of results 1926–1932.

For all these years very thorough anti-larval measures have been carried out in all estates.

Estates.	No plasmoquin used, but anti-gametocyte treatment (eu-quinine and milk) for children used regularly.					
	1926. March 1st to May 31st.			1927. March 1st to June 22nd.		
	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Approximate percentage of true malaria.	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Approximate percentage of true malaria.
Munjamullay ..	125	15	100	169	17	100
Injikadu ..	149	42		352	73	
Nellikai ..	86	17		236	36	
Tangamullay ..	157	31		445	50	
Passamullay ..	..	..		..	..	
	Healthy year—malaria mild.			Malaria rather severe.		

Estates.	No plasmoquin used, but anti-gametocyte treatment (eu-quinine and milk) for children used regularly.					
	July 1st, 1927 to June 30th, 1928. Whole year.			July 1st, 1928 to June 30th, 1929. Whole year.		
	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Approximate percentage of true malaria.	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Approximate percentage of true malaria.
Munjamullay ..	96	10	Winter 75—80.	320	35.5	Winter 73.
Injikadu ..	108	17		110	22.4	
Nellikai ..	117	16		240	34.1	Summer 95.
Tangamullay ..	192	44	Summer 100.	700	126	
Passamullay ..	137	24		350	47.6	
	Healthy year—malaria mild.			Very unhealthy year.		

Estates.	Plasmoquin anti-gametocyte after-treatment influences figures (use commenced autumn 1928).							
	July 1st, 1929 to June 30th, 1930. Whole year.				July 1st, 1930 to June 30th, 1931. Whole year.			
	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Percentage of true malaria obtained by blood examination.	Percentage of true malaria of total population.	Total cases reporting sick with fever.	Percentage of total population reporting sick with fever.	Percentage of true malaria obtained by blood examination	Percentage of true malaria of total population.
Munjamullay	151	18	30	**6**	84	5	40	**2**
Injikadu	76	16	41	**7**	12	2	42	**1**
Nellikai	222	32	33	**10**	135	27	40	**11 ***
Tangamullay	266	60	25	**15**	88	19	26	**5**
Passamullay	132	20	33	**7**	12	5	50	**2.5**

* Newcomer cases are not eliminated from these figures, otherwise these would be considerably lower.

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reporting sick with fever of any kind, has had the blood examined. Consequently the figures are progressively more valuable, as the years pass. For all years anti-gametocyte measures have been adopted, with regard to the children, cu-quinine and milk being used, until the end of 1929. In 1930 and 1931, this was not necessary because the children were very free from parasites, but children with enlarged spleens were so treated during the malaria season.

The outstanding point which the table demonstrates is the effect of the plasmoquin anti-gametocyte after-treatment. Up to the end of June, 1929, the percentage per annum sick from true malaria for the estates, in spite of anti-larval measures and dosing of children, was very considerable; it was never less than about 30 per cent., and 45 per cent. per annum was often reached. The only exception to this statement is Injikadu, and this was undoubtedly due to the fact that half the lines on the estate were pulled down and reconstructed on a better site.

Within twelve months of the use of the plasmoquin anti-gametocyte after-treatment, which was started in the autumn of 1928, the percentage of malaria sick throughout the year was in the neighbourhood of 10 per cent. Within two years it is further reduced, sometimes as low as 2 per cent. It is true that the Nellikai figures for this year are bad, but this is undoubtedly due to the introduction of highly infected gangs of coolies from outside without proper treatment on arrival on the estate. In three out of five estates the maximum percentage sick with malaria for the year is under 3. This rapid decline from 30 to 3 in two years cannot be accounted for by the anti-larval measures alone, though, of course, they have had an influence. The figures therefore demonstrate very perfectly two points which we have already discussed in the previous paper, namely, that the proper way of stopping reinfections from malaria is to reduce both the anopheline population and the gametocyte carriers at the same time, and that the anti-gametocyte after-treatment is a satisfactory and easily-carried-out method of reducing to very small proportions the number of gametocyte carriers in any labour force.

REFERENCE.

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INDIAN SPECIES OF ARTEMESIA.

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THE plant artemesia is a very ancient remedy and was extensively used by the Greeks and Romans to expel intestinal worms, and as a stomachic. The old Arabian and Persian physicians used it for the same purpose and it was probably introduced into India by them, as no mention of this drug could be found in the old Sanskrit works on Ayurvedic or the Hindu medicine. The flowering tops have been, and are to this day, largely used in the Tibbi or the Mohammedan medicine in India as an anthelmintic. Usually they are powdered, and are given in 2 to 4 drachm doses. The drug is also used as a remedy for dropsy. A decoction, which would consist mainly of the essential oil, is made from the plant and is used as a cardiac and as a respiratory stimulant. *Artemesia maritima* Linn. (*A. brevifolia* Wall.) grows abundantly at high altitudes in the Himalayas from Kumaon to Kashmir; and it is said to grow even more abundantly and uniformly in Baluchistan, Chitral and Afghanistan. It grows in such abundance in the last-named country that it is used as a packing material for fruit which is imported from Kandahar. In spite of the abundant supply, santonin was not manufactured in India either for internal consumption or export, until very recently.

Before the War practically all the santonin on the Indian market was of Russian origin and was imported from Europe. It was obtained from *Artemesia cina* Berg. but there are many allied species, such as *A. maritima* var. *stechmanniana* Besser (*A. lercheana* Karel and Kiril), *A. pauciflora* Stechm., etc., which are indigenous in the vast uncultivated plains of the Kirkhiz in Turkestan. Many species of artemesia are also widely distributed over different parts of Europe, Asia and America. Formerly large quantities of the strongly-aromatic flower heads were collected and sent to the European markets, especially to Moscow and Petrograd; some also found their way to India through Afghanistan and Persia. Factories were later established in some of the large towns in Turkestan where santonin is extracted and the purified product is now mainly exported. Some years ago there was a great scarcity of santonin owing to the wasteful and destructive methods of collection, and to the political and economic upheaval in Russia. Efforts were, therefore, made to find other sources of the drug with a view to increasing its output. The plant was found only in a restricted area in Turkestan and attempts at the extension of cultivation had hitherto failed. Extensive investigations have been carried out from time to time on other plants of the same genus, as additional or replaceable sources of santonin. Van Laren has successfully cultivated *A. cina* in Holland; this has yielded as much as 1.3 per cent. santonin. Some of the American species of artemesia growing in Mexico and the neighbouring states have also yielded santonin. *Artemesia gallica* grown in France was found by Heckel and Schlagdenhuaffen

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to contain santonin although the percentage was not stated by them. An examination by Maplethorpe in 1924 of *Artemesia gallica* and *A. maritima* found in the south of England led to the conclusion that the English variety of these plants contained very little or practically no santonin. Despite the large amount of work done on various species of artemesia growing in Europe and America, it was not found possible to find a variety which contains a workable percentage of santonin and which can stand comparison with the Russian species.

Indian species of artemesia.

Many species of artemesia grow in the Himalayas, but *Artemesia brevifolia* Wall, which contains santonin, grows fairly abundantly in certain parts of Kashmir (Gurez, Telel, Astore, Baltistan, etc.). Gurez can yield about 150 tons of the dry material annually and this yield can be considerably increased. Large quantities can also be gathered from the neighbourhood of Astor. Both these areas, however, are difficult from the point of view of transport. A factory for the manufacture of santonin in Kashmir has been under contemplation for some time and although a certain amount of santonin has been produced, it does not appear to have been manufactured on a commercial scale. The reason probably is that the price for artemesia charged by the Kashmir State authorities is so high that it will probably not be possible for any private firm to manufacture it successfully on a commercial scale. The cost of transport of the raw material from inaccessible mountain ranges further adds to the expense. Unless the price of raw materials is considerably reduced there is very little chance of this industry making any headway.

Within recent years (1926-27), a new source of santonin has been discovered in India. In the Kurram Valley in the North-Western Frontier Province, at a height of 4,000 to 5,000 feet above the sea level, artemesia has been found growing in abundance. The area first discovered under artemesia was estimated by the Botanical Survey Department to be roughly 200 acres of fairly thick crop, but there are many similar areas in the adjacent hills and there is a larger tract of more than 2,000 acres, with a crop of varying density, scattered over it. Several closely-related species of artemesia have been collected from this locality. *Artemesia maritima* is found in most parts of this valley and is known by the name *Spirah tarkhah*, and this is the variety which bears santonin. The other species, such as *A. salsoloides*, *A. absinthium*, *A. campestris* and *A. vulgaris*, which were collected showed no santonin whatsover on analysis. The discovery of this new source of santonin in India is of far-reaching importance to the drug world. The estimated yield of saleable product that could be obtained from this locality is indeed very satisfactory. About 1,700 pounds of green leaves and stalks can be obtained from one acre and after drying and removing the stalks about 425 pounds per acre of saleable product could be easily collected. This is the minimum estimate and, if properly protected by closing certain parts to grazing, the area would in a year of normal rainfall yield about 6,000 pounds of green crop giving 1,500 pounds of saleable product per acre. According to this computation, from 200 acres of thick crop it will be possible to get a hundred tons of good leaf and if the other available and adjacent areas are worked up, there is no doubt that a constant supply of 100 to 200 tons could be maintained for years, specially as the crop could be cut twice in a season, *i.e.*, in June and in September. This will place India in a very promising position as regards her santonin requirements. Preliminary analyses carried out on the Kurram Valley artemesia unfortunately show a poor santonin content, almost half the quantity found in artemesia growing in Kashmir. The commercial exploitation of this source may, therefore, appear to be a risky venture, but the proximity of these areas to railways and the consequent gain in transit charges cannot be totally ignored. Further work is in progress with regard to future possibilities in connection with this drug. Besides the artemesia already growing wild, a very large area of waste land is suitable for cultivation and it would only be necessary to protect it and give it an occasional watering to produce good crops. If these operations are successful, it is to be expected that India would, not only be completely self-supporting as regards her santonin requirements, but will be able to export a large amount.

Santonin content of Indian artemesia.

The active principles of *A. maritima* consist of:—(1) a volatile oil, which has an odour resembling cajuput oil and camphor, (2) santonin, and an allied body, artemesin.

The amount of santonin extracted from the Russian artemesia is usually 1.2 to 1.4 per cent., but it may be as high as 2.3 to 3.6 per cent. It appears from several analyses made by Dr. Greenish, Dr. Simonsen and the Imperial Institute chemists that 1.95 per cent. of santonin may be obtained from flower buds and leaves. Later estimations, however, have proved that the yield from the Kashmir artemesia is lower still and seldom goes beyond 0.5 per cent. This is partly due to the fact that the santonin content of *A. maritima* from these regions is naturally somewhat low, and that unless it is collected at the proper time the yield is still further reduced. It has been shown that the plants collected in June from Kashmir (Gurez) have no santonin at all; those collected in July and August showed from 0.1 to 1.0 per cent, the latter being the

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maximum yield. In the first half of September, the santonin content again falls to 0.1 per cent., and later than this it is entirely absent, or only present in traces.

The method of extraction of santonin followed by the chemists in India is also said to be responsible to a certain extent for the low yield. In the factories of Russia, santonin is extracted by a new and improved method said to be devised by Dr. Phil. Ferdinand Krauss of Braunschweig. This method allows nearly 98 per cent. of contained santonin to be extracted from the flower buds of the plants, whereas in India only 70 to 80 per cent. of the santonin is obtained. If the former method is used in India the yield could be increased by cutting down the waste which is at present sustained in the process of extraction.

The method of collection of the plant has also been defective. In old days the whole plant was cut off from the root, and the flowering tops, the leaves and the stalks were all mixed together. As the woody stalks contain little or no santonin this further helped to reduce the percentage. The method now employed is to strip off the leaves and flower-buds directly from the plant by hand and then dry them in the sun. This method is less wasteful as the plants from which the leaves and flower-buds are stripped off do very well. Not only their future growth and development are unhindered, but they bear fresh leaves. The cutting off of the whole plant is not only harmful from the point of view of future growth, but is expensive both for labour and transport.

A comparative examination of the physical and chemical properties of the Indian santonin shows that it comes up to the Russian santonin. The slight differences noticed are probably due to traces of impurities. The pharmacological action and toxicity of the Indian variety also corresponds to that of the variety imported from Europe. A series of cats, whose stools were previously examined and found to contain ova of belascaris and hookworms, were given the drug in doses ranging from 45 to 80 milligrammes. The belascaris were expelled, and the ova disappeared from the stools. No toxic symptoms were produced in these animals.

The therapeutic efficacy of the drug was tested by clinical trials in a large number of cases in the Carmichael Hospital for Tropical Diseases, and in the Alipore Central Jail, by Chopra and Chandler (1924). Indian santonin was given combined with calomel and sodium bicarbonate. The stools were carefully washed 48 to 72 hours after administration of the drug, and examined for the presence of the parasites. Ten days later the stools were re-examined by the Kofoid and Barber technique for the presence of ova. The results with Indian santonin compared favourably with those ordinarily obtained with European santonin. On ascaris it was found to be more effective than chenopodium. That Indian santonin compares favourably with the Russian santonin so far as its therapeutic efficacy is concerned has been confirmed by further trials carried out by Dr. Maplestone in the Carmichael Hospital for Tropical Diseases.

Recent work by Maplestone and Mukherji (1931) shows that the percentage of cures with santonin alone is not so high as obtained by Chopra and Chandler. A combination of santonin and chenopodium is said to be much more effective in the treatment of ascaris than either of these drugs given singly. Dr. Maplestone gives 5 grains of santonin and one capsule containing 1 cubic centimetre of oil of chenopodium, with water; two hours after, one to two ounces of saturated solution of magnesium sulphate are given. By this method over 90 per cent. can be cured by a single treatment.

Economic possibilities.

Santonin, it has been pointed out, is one of the most expensive drugs in the pharmacopœia, its current price being about Rs. 400 per pound. During the War and for some time after, it was selling at Rs. 720 per pound, a single dose of 3 grains costing nearly a rupee. Even with the introduction of such anthelmintics as chenopodium which are very active against ascaris, it is found that a combination with santonin gives better results. The huge demand of santonin, therefore, can easily be understood. For mass treatment in a poor country like India, it is essential that some source be found from which santonin can be extracted and sold at a very much cheaper rate than the present one. From what has been said above it will be seen that if all the Indian resources are developed this should not be difficult. The incidence of ascaris and oxyuris infections amongst the population of this country is very heavy indeed. This will be seen from an estimate made by a previous worker (Chandler, 1927) in helminthological department of the Calcutta School of Tropical Medicine and Hygiene. Over 65 per cent. of the population in Burma, Assam, Orissa and parts of Madras, where the rainfall is heavy and the surface water abundant during the monsoon season, appear to be affected; in Bengal and parts of Bombay the incidence is from 35 to 50 per cent. and in the United Provinces, it varies from 15 to 25 per cent.; in the drier parts of India like the Punjab and Rajputana, though the incidence is less than in the parts mentioned above, it is in no way insignificant. The development of the santonin industry will therefore be very beneficial to all concerned.

We are grateful to Mr. S. N. Bal, Curator, Indian Museum (Industrial Section), for giving us facilities to go through his records.

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FURTHER OBSERVATIONS ON THE EFFECT OF OPIUM ON BLOOD SUGAR.

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(*Drug Addiction Inquiry, I. R. F. A., Series No.* 13.)

It is commonly believed, in this country, that opium has beneficial effects in those suffering from diabetes. In Bengal where glycosuria is frequently met with in the well-to-do classes, it is not uncommon to meet people who take small doses of opium with apparent improvement for symptoms such as polyuria and thirst. The sugar present in the urine is reduced, or may disappear entirely. The basis for this belief is not clear. That morphine has a direct effect on carbohydrate metabolism is amply proved by experiments on animals and man. Moderate doses of morphine, it has been shown, cause hyperglycæmia and not hypoglycæmia. In man, and in experimental animals such as the dog and the rabbit, this hyperglycæmia may be prevented by starvation. In habituated animals and in normal human beings the hyperglycæmia is never so great as to cause glycosuria. In partially pancreatectomised dogs hyperglycæmia follows after subcutaneous injections of such small doses as 2 milligrammes per kilogramme of body weight. It has also been shown that in diabetic patients who are on strict diet injections of one-fourth of a grain of morphine produced no change in the blood sugar. If, however, morphine is given before taking a definite quantity of sugar, the resulting glycosuria is decreased by better assimilation caused by the delay in its absorption from the alimentary canal.

Opium contains other alkaloids besides morphine and, as it has a much stronger depressant action on the motility of the alimentary tract, the absorption of carbohydrates after its administration would be much slower than after morphine administration. This may possibly lead to a decrease of the sugar both in the blood and in the urine. To determine whether this was the case or not we tried the effect of small and moderately large doses of opium on three series of patients in the Carmichael Hospital for Tropical Diseases, (1) diabetic patients, (2) normal patients, and (3) patients suffering from nephritis.

Patients referred to in table I were all diabetics. A perusal of this table will show that in the early and mild cases of diabetes (cases 1, 2, 3, 4 and 6) the drug exerted some influence in reducing the amount of sugar in blood. In moderately severe cases of diabetes or cases of a long standing (cases 5, 7, 8, 9 and 10), on the other hand, the blood sugar either remained stationary or even increased after administration of opium.

The patients in this group were put on a balanced diet so that the excretion of sugar in the urine was more or less uniform. The results of such investigation are only of value if the food intake and the effect of the quantity of carbohydrate allowed produced on the blood and urine sugar are known. The patients were, therefore, kept strictly on the same diet beginning a few days before the drug was administered and carried on for a few days after the drug was stopped. Great care was taken to maintain the same standard of diet throughout the test. Opium was administered in the form of a mixture so constituted that one ounce contained one to two grains of the drug, the taste being concealed by putting in oil of citronella. The patient thus had no idea of the nature of the drug he was taking.

The individuals referred to in table II were either non-diabetics suffering from minor ailments or normal individuals.

A perusal of this table will show that in most of the cases the blood-sugar level remained more or less constant, except in case 1 where the blood was abnormally low at the beginning of treatment; much benefit followed during the course of opium treatment. The blood sugar increased and tended to approach the normal figure and the weakness from which the patient suffered became much less marked.

The patients referred to in table III all suffered from nephritis.

It will be seen from a perusal of this table that the initial blood sugar in all these patients was either normal or below normal whereas it is our experience that in severe cases of nephritis there is almost always a hyperglycæmic condition owing probably to the raising of the renal threshold. This is supported by the fact that in patients suffering from diabetes who were passing moderate amounts of sugar in the urine sugar excretion shows a definite decrease when nephritis develops. The reason for the low initial blood sugar in table III may be that the majority suffered from general œdema and the blood was in a hydræmic condition. Even so when this condition improved, as it did after treatment in this series, the blood sugar either remained the same or was slightly lower, showing that the administration of either moderate or large doses of opium in nephritis does not affect the renal threshold adversely. This subject is being studied in more detail.

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TABLE I.

Diabetic patients.

Serial No.	Description of patient.	Age.	Maximum daily dose of opium.	Total amount of opium administered.	Period of opium administration.	Blood sugar per cent.		Remarks regarding blood sugar.
						Before opium administration.	At the end of opium administration.	
1	Mild type	35	4 grs.	22 grs.	10 days	0.230	0.186	Definite reduction.
2	"	52	6 "	107 "	25 "	0.240	0.173	"
3	Same case as above.	52	6 "	41 "	14 "	..	0.130	After a second course still further reduced.
4	Mild type	30	4 "	52 "	25 "	0.180	0.110	Definite reduction.
5	"	28	4 "	57 "	24 "	0.126	0.146	Slight increase.
6	Moderate type.	45	6 "	60 "	17 "	0.275	0.212	Definite reduction.
7	"	49	3 "	31 "	15 "	0.176	0.176	Unaffected.
8	"	55	4 "	57 "	17 "	0.234	0.264	Increased slightly.
9	"	59	3 "	45 "	22 "	0.190	0.262	Markedly increased.
10	Severe type	..	6 "	83 "	14 "	0.390	0.440	"

TABLE II.

Non-diabetic patients.

Serial No.	Condition of individual.	Age.	Maximum daily dose in grains.	Total dose of opium given in grains.	Period of opium administration, in days.	Blood sugar per cent.		Remarks regarding blood sugar.
						At the beginning of opium administration.	At the end of opium administration.	
1	Debility	40	3	24	11	0.045	0.070	Slight increase to normal.
2	..	30	7	65	16	0.120	0.092	Slight reduction.
3	Dysentery	40	16	188	23	0.105	0.092	More or less unaffected.
4	Gastritis	35	4	31	12	0.081	0.090	Unaffected.
5	Normal	27	4	43	18	0.068	0.068	"
6	"	23	4	43	17	0.090	0.082	"
7	"	36	4	44	19	0.077	0.082	"
8	"	24	5	49	13	0.106	0.108	"
9	Debility	..	4	58	23	0.081	0.075	"
10	Skin disease.	21	7½	102	22	0.085	0.081	"

Discussion.

It has been shown that in early and mild cases of diabetes opium may reduce blood sugar and glycosuria may disappear. This apparently is the basis of belief prevalent among physicians as well as among the laity that opium is beneficial in diabetes. It is very difficult, however, from mere clinical studies of mild cases to judge accurately the value of this drug. It is well known that carbohydrate tolerance of mild diabetes varies with the diet regulation and the general condition of the patient, and that slight alteration in the diet, or a little delay in the absorption of carbohydrate from the gut, may temporarily reduce the blood sugar even though no drug has been administered. These facts may account for the reduction of blood sugar obtained in some of the cases described in the first series.

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TABLE III.

Patients with kidney disease.

Serial No.	Condition of patient.	Age.	Maximum daily dose in grains.	Total dose of opium given in grains.	Period of opium administration, in days.	Blood sugar per cent.		Remarks regarding blood sugar.
						At the beginning of opium administration.	At the end of opium administration.	
1	Nephritis	27	8	128	25	0.085	0.095	Slight increase.
		32	9	132	36	0.083	0.085	Unaffected.
2	"	30	5	55	18	0.112	0.106	"
3	"	27	6	82	20	0.080	0.080	"
4	"	48	4	43	17	0.082	0.077	"
5	"	55	3	34	16	0.082	0.082	"
6	"	27	3	35	24	0.080	0.082	"
7	"	22	3	29	14	0.090	0.082	"
8	"	52	4	45	17	0.072	0.070	"
9	"	46	3	33	18	0.070	0.060	"
10	"							

In the second and third series of cases there is very little doubt that opium has had no appreciable effect on the blood sugar.

Summary and conclusions.

(1) Opium in 1 to 6 grain doses may reduce blood sugar in the early and very mild type of diabetes. In severe forms of the disease the blood sugar may be actually increased. In some patients opium raises the renal threshold of excretion so that while the urinary sugar may disappear, the blood sugar may increase. It is, therefore, not advisable to use it in this disease.

(2) Small and moderate doses of opium have little or no effect on the blood sugar of individuals showing no disturbances in carbohydrate metabolism. In patients whose blood sugar content is abnormally low opium may raise it, and in this way improve their condition.

(3) Small and moderate doses of opium have no effect on the blood sugar of patients suffering from nephritis. The renal threshold in these cases does not appear to be adversely affected.

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THE TREATMENT OF ASCARIASIS.

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IN a paper on the value of santonin prepared in India from *Artemesia maritima* growing in the Western Himalayas, Chopra and Chandler (1924) give particulars of the treatment of twenty-five cases. They claim to have cured twenty-three, or 92 per cent., of these with one treatment. The test of cure they accepted was a single negative examination of the stools for eggs by the Kofoid and Barber technique ten days after treatment. The adult patients were given santonin grains 5, calomel grains 5, and sodium bicarbonate grains 5, the doses for children being appropriately reduced. In nearly all the cases the dose was given at night and a purge of magnesium sulphate in the morning, but three of them received their treatment in the morning without any purge.

The percentage of cures in this series was so unusually high that we decided to adopt it as the routine treatment for all cases of uncomplicated ascaris infection at the Calcutta School of Tropical Medicine. A series of twenty-eight out-patients and nine in-patients was treated with Indian santonin, calomel, and sodium bicarbonate on exactly the above lines, and we cured 42.85 per cent. of out-patients and 44.4 per cent. of in-patients. At this stage Indian santonin ran out of stock and no more was obtainable, so Russian santonin was substituted. This was used in the same way as the Indian santonin and forty-four out-patients and nine in-patients were treated, with 20.5 per cent., and 66.6 per cent. of cures, respectively. The great difference between the number of cures in out-patients and in-patients in this series of cases suggested that there was some factor which made this form of treatment unsuitable to the former. It was thought that the most likely cause of the comparatively few cures among these out-patients, was that we had to rely on the patients carrying out our instructions to take the powder at night and the purge in the morning in their own homes, and that they probably did not do so in a good

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number of cases. The only difference between our two series of cases and that of Chopra and Chandler was that they accepted a single negative examination of the stools, by Kofoid and Barber's method, ten days after treatment, and that we relied on a single negative examination the same time after treatment, but we used Lane's "D. C. F." method. On account of the relatively low rate of cure with santonin when a more exacting test of cure was employed, and on account of its relatively great expense we decided to carry out a comparative series of treatments using oil of chenopodium.

This drug was given in three doses of ten minims each in capsules at intervals of one hour, with a purge of magnesium sulphate two hours after the last dose of oil. Children of course had appropriately reduced doses, according to age. This form of treatment is somewhat prolonged for use in ordinary practice or for treating large numbers of patients at one time, and we only made use of it in order to obtain the maximum anti-helminthic effect of the drug. Out-patients were detained and given the whole treatment under our supervision. Twenty-three out-patients, with 56.5 per cent. of cures, and forty-four in-patients, with 54.5 per cent. of cures, were treated in this manner. The test of cure was the same as for the two santonin series. These figures appear to be slightly better than those of santonin and thus bear out the statement by Hall (1930) that oil of chenopodium is the best drug against ascaris.

Even these results leave a great deal to be desired, so we decided to try the effect of santonin and oil of chenopodium combined. The dosage employed was santonin grains 5 in powder, and oil of chenopodium minims 15 in a capsule, for adults, with reduced doses for children. The two drugs were swallowed together with the assistance of a little water and were followed in two hours by a dose of magnesium sulphate. An immediate advantage of this treatment was that it greatly reduced the time out-patients were detained. Twenty-three out-patients with 56.5 per cent. of cures, and thirty-four in-patients with 82.3 per cent. of cures followed this treatment.

There is a considerable discrepancy between the number of cures in in-patients and out-patients in these figures, and as all the treatments had been given under observation, an explanation other than that of failure to take the drugs had to be sought. The first thing that suggested itself was that in-patients had light diet the day before treatment and that they received their treatment in the morning when the bowel was probably fairly empty, whereas, although out-patients were told to take only a little food on the morning of the day they came for treatment, there was no way of finding out if our instructions had been observed. Another point that emerges from a detailed examination of the particulars of all the cases treated is that adults appear to be more readily cured of their ascaris infection than children, whatever form of treatment was employed. In the case of in-patients treated by combined santonin and oil of chenopodium the number of adults is unusually great, and this may also partially explain the high cure rate in this series.

The influence of age of patients on the cure rate is difficult to assess with the figures at our disposal, for division of the cases under the various forms of treatment into different age groups makes the numbers in each group much too small for purposes of comparison, but omitting the figures for out-patients treated with Russian santonin, which we have shown to be probably unreliable, we have added the figures for all the adults and all the children separately whatever form of treatment they have had. We have not included in this addition those persons treated with santonin and oil of chenopodium together, as these are the figures with which we wish to compare them. We find that in the totals obtained from the addition of the different forms of treatment we have thirty adults with 60 per cent. of cures and eighty-three children with 48.2 per cent. of cures, and for the combined santonin and oil of chenopodium there are twenty-six adults with 92.3 per cent. of cures, and thirty-one children with 54.8 per cent. of cures. All of the above cases were submitted to the same test of cure and the work was done by the same people throughout, therefore the figures are strictly comparable. It seems reasonable to conclude from the above results that combined santonin and oil of chenopodium is a more efficient ascaricide than either of these drugs alone.

TABLE.

Treatment.	Number of out-patients.	Number of cures.	Per cent.	Number of in-patients.	Number of cures.	Per cent.
Indian santonin	28	12	42.85	9	4	44.4
Russian santonin	44	9	20.5	9	6	66.6
Oil of chenopodium	23	13	56.5	44	24	54.5
Santonin and oil of chenopodium ..	23	13	56.5	34	28	82.5

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The apparently higher cure rate in adults compared to children is interesting, and it is also possibly an important factor, because, if further investigation shows it is correct, it will always have to be considered when assessing the value of any form of treatment. Two possible explanations suggest themselves, one or both of which may be operative.

The first suggestion is that the parasites are comparable in age whatever the age of the host, and that the larger dose of anthelmintic permissible in the treatment of an adult has a more powerful effect on the worms than the reduced doses given to children. The second theory advanced is that in many mammals it has been shown that the young are more readily infected with helminths than adults of the same species, and that in some cases certain worm infections tend to die out naturally as age advances. It is possible that a similar influence is at work in human infections with ascaris, and that the apparent ease with which an adult is cleared of his infection compared with an adolescent or a child is that the latter is more hospitable to his worms, and accordingly they resist evacuation more successfully, as they are in a more suitable environment.

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A SHORT CLINICAL NOTE ON TINCTURE OF EPHEDRA AS A CARDIAC STIMULANT.

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THE value of ephedrine as a therapeutic agent has been appreciated for some years but little attention has been paid to its dextro-rotatory isomer pseudo-ephedrine. This latter alkaloid occurs in large quantities in the Indian species of ephedra, most of the specimens containing a proportion of 50 per cent. of the total alkaloid content. Lieut.-Col. R. N. Chopra, I.M.S., and his collaborators of the Department of Pharmacology at the Calcutta School of Tropical Medicine and Hygiene, have made a special study of this alkaloid (Chopra, Dikshit and Pillai, 1929 and 1929*a*, and Chopra and Basu, 1930). They found that the pharmacological action of pseudo-ephedrine closely resembles that of ephedrine. Both alkaloids are rapidly absorbed from the gastro-intestinal tract and produce constriction of the blood-vessels and a well-marked rise in blood pressure. The vaso-pressor effect is much stronger in the case of ephedrine which acts almost entirely on the vasomotor endings, while pseudo-ephedrine has been shown to have some stimulant action on the muscle of the vessel walls as well. In addition, and a point of great importance, pseudo-ephedrine has been shown to have a distinct stimulant action on the myocardium.

It has been shown of late that ephedrine has a distinct action in increasing the coronary circulation. This action will be seen to be of peculiar importance in juvenile subjects of acute infectious disease, in whom there is often evidence of early adrenal exhaustion and consequently, it may be presumed, a tendency to deficiency in the coronary circulation.

It is clear that the combination of the properties of ephedrine and pseudo-ephedrine in just proportion should provide a cardiac stimulant superior to ephedrine alone in that due balance will be maintained between vessel constriction on the one hand and myocardial stimulation with increased coronary circulation on the other.

Lieut.-Col. Chopra has accordingly introduced a tincture made from the Indian species of the plant which contains the two alkaloids in about equal proportions. This preparation is so standardised that 5 cubic centimetres contain about half a grain of the alkaloids. It has been tried in the Carmichael Hospital for Tropical Diseases with excellent results as a cardiac stimulant in the failing heart of epidemic dropsy.

The need for a cardiac stimulant of this nature is felt by the clinician at every turn and the present writer has made use of this preparation in the treatment of acute toxic conditions of the heart, in pneumonia, diphtheria and septicæmia. His observations point to the conclusion that in tincture of ephedra we have a very valuable addition to the list of cardiac stimulants. The following cases are offered as examples:—

Case 1.—A. D., European male, aged 40. The patient was seen in consultation on the fourth day of the disease. He was suffering from extensive pleuro-pneumonia on the right side. The essential clinical feature was an alarming loss of vitality and profound prostration. The blood pressure was 90/62. The pulse 105, feeble and irregular. After the administration of tincture of ephedra, one drachm six hourly, there was marked improvement in the general condition and the systolic pressure rose to 110. On the 10th day the irregularity of the heart became more marked and tincture digifortis was accordingly added, but without omission of the ephedra. After this there was gradual improvement, the temperature fell by lysis and the patient made an excellent recovery.

Case 2.—D. H., female, aged 6. On the 12th day after the resolution of a measles rash the temperature rose abruptly to 104°F. From the nose there was a thick purulent discharge, which proved to be streptococcal. On the 13th day a septic rash appeared on the face and all over the body and limbs, followed two days later by the development of massive pneumonia in the right lung and shortly after in the left. The whole of the right lung appeared to be consolidated.

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The child was of the type in which any form of lung infection must be of great danger as she was the subject of an extreme degree of funnel chest. In health the thoracic breathing was limited owing to the depression of the sternum and during the pneumonic invasion the thorax was absolutely immobile. The highest rate of abdominal respiration reached was 80, while the pulse at times could not be counted. For the first week the condition of the patient was extreme and recovery seemed impossible. In addition to oxygen, which was necessary almost continuously for days, the main stimulant on which reliance was placed was tincture of ephedra, in doses of 15 minims four-hourly; this induced a steady improvement in the pulse volume. The temperature fell by lysis, reaching normal on the 17th day, and the patient made a perfect recovery with complete resolution in both lungs.

Case 3.—D. W., aged 46. General septicæmia of sudden onset with marked early toxic myocarditis. On the third day of the disease the systolic pressure was 98, against the estimated average for this patient of 140-150. After the administration of tincture of ephedra, one drachm six-hourly, the pressure rose to 130. On the sixth day, on the supervention of auricular fibrillation, tincture digifortis was added, but, as omission of tincture of ephedra led to a drop of pressure, this was continued. The patient survived four weeks, but successive invasions of the pleuræ, pericardium and meninges proved fatal. It was clear, however, that the value of the preparation in keeping up the tone of what was, from the earliest days, an acute toxic myocarditis was without question.

Case 4.—G. G., aged 7. A case of diphtheria of moderate severity. During convalescence the patient who was far more active than was desirable at this stage was subject to sudden attacks of pallor with accelerated pulse. Tincture of ephedra, 10 minims six-hourly, was given with the result that not only was the tone of the pulse improved but no further attacks supervened.

Recently, the writer has had under treatment three cases of pneumonia, two influenzal and one of the lobar type. The subjects were in a poor state of nutrition; two lapsed early into delirium and the outlook was bad. In addition to other therapeutic measures, tincture of ephedra, one drachm six-hourly, was given supported by intravenous injections of glucose. Though the administration did not cause any marked rise in pressure, there was a definite improvement in the character of the pulse and all three patients recovered, a consummation not altogether to be anticipated.

The above are but a few briefly-outlined cases of many in which this preparation has been used; the general impression gained is that the drug is of particular value where, in acute disease, there is a danger of heart failure owing to toxic myocarditis.

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THE CURATIVE VALUE OF A LOCALLY-PREPARED SAMPLE OF SULPHARSENOBENZENE.

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By the courtesy of Dr. U. N. Brahmachari, late Additional Physician, Medical College Hospitals, Calcutta, sulpharsenobenzene, as prepared in the "Brahmachari Research Institute", was supplied to the senior writer (B. G. M.) for the treatment of syphilis in the Police Hospital, Calcutta.

The present paper is our preliminary report on the curative value of this compound in various stages of syphilis in patients with positive Wassermann reaction, or *Treponema pallidum* in the local lesion, or both.

The compound supplied to us is a yellowish powder readily soluble in water. The solutions used by us were made with freshly-prepared redistilled water, recently boiled and cooled. The solutions were injected immediately after preparation. We have used a 10 per cent. solution which is slowly injected subcutaneously or intramuscularly into the buttocks.

Generally we begin the treatment with a small dose of 0.075 gramme to 0.15 gramme in order first to test the susceptibility of the patient towards the drug and then increase the dose at short intervals. The higher doses of 0.6 gramme to 0.8 gramme are given at longer intervals of about a week.

Our cases were classified into different groups according to the manifestation of signs and symptoms. In each case, examination of urine was made and the Wassermann reaction tested repeatedly throughout our treatment. The patient was put on simple diet and kept under observation at least for four months from the beginning of treatment. In cases with chancre, scrapings from the local lesions were examined for *Treponema pallidum*. After these preliminary examinations, the patient was treated with the compound, as an outdoor patient. This system of treating the patients has been a great advantage, as the patients could attend to their duties in the usual way and the difficulties in having to accommodate them in hospital as indoor patients were overcome.

The curative value of the compound was observed by the disappearance of clinical signs and symptoms of syphilis manifested by the patient, and the Wassermann reaction becoming and remaining negative.

Our treatment consisted of (1) local, (2) general, and (3) specific or antisyphilitic treatments. For pyorrhœa tincture of iodine, glycerine tannic acid, tincture of aconite root and tincture of myrrh in equal proportion were

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painted on the gums. Locally the ulcer was dressed with black-wash and an ointment of iodoform gr. xx, zinc oxide ʒi, lanoline ʒi, oil olive ʒi, and aqua calcis ʒi. In case of suppurated glands, they were removed. For specific treatment, only this compound was used.

Our cases have been divided into four groups:—

Group I.—This series includes patients with an inoculation lesion.

Total number of cases, 5 (cases 1 to 5).

Indurated chancre present in all these cases. *Treponema pallidum* was found in all cases in the scrapings from the lesion. Wassermann reaction was negative at the beginning of treatment and became positive for a short period after 1 or 2 injections. Subsequently it was permanently negative. In all cases no *Treponema pallidum* was found in the scrapings from the lesion after three injections.

Group II.—This series includes patients with positive Wassermann reaction with a history of inoculation lesion, or with an inoculation lesion, with adenitis but no other outward signs or history of general infection.

Total number of cases, 20 (cases 6 to 25).

This group consisted of (*a*) cases of old healed chancre with inguinal adenitis with suppuration in three cases (6 to 8) and without suppuration in one case (9), and (*b*) cases of unhealed chancre with inguinal adenitis in 16 cases, with suppuration in 9 cases (10 to 18) and without suppuration in 7 cases (19 to 25). In all cases, the chancre healed up quickly. In suppurating cases the glands were removed and the wound was kept open and dressed. Non-suppurating adenitis subsided in all cases except two (24 and 26) in which the glands were removed and the wound was stitched up. General conditions were markedly improved.

Group III.—This series includes patients with positive Wassermann reaction with outward signs and symptoms of general infection.

Total number of cases, 17 (26 to 42).

This group includes (*a*) 6 cases (26 to 31) with syphilitic arthritis of the knee joints, rise of temperature, giddiness, gastro-intestinal disturbances, etc., (*b*) 2 cases (32 and 33) with iritis, inguinal adenitis, slow fever, constant supra-orbital headache, etc., (*c*) 3 cases (34 to 36) with inguinal adenitis, general weakness, chronic pharyngitis, anæmia, etc., (*d*) 4 cases (37 to 40) with skin eruptions, inguinal adenitis, anæmia, headache, pain all over the body, etc., and (*e*) 2 cases (41 and 42) with skin eruptions, slow fever, general weakness, anæmia, hæmoptysis, constant headache, and pain in the loins.

In the course of treatment pain in the knee joints subsided within a short time. Patients could walk freely after 5 or 6 injections. General condition improved remarkably in all cases. Operations wounds, after removal of the suppurating glands, healed up quickly. Skin eruptions disappeared after 4 or 5 injections. In case 31, the Wassermann reaction remained positive throughout our observations, though the joint pains and other signs and symptoms disappeared completely. In case 42, the skin eruptions persisted and the Wassermann reaction remained positive, though the other signs and symptoms disappeared.

Group IV.—This series includes patients with the following symptoms which appear to be of syphilitic origin as was proved by positive Wassermann reaction and their disappearance after specific treatment:—

Anæmia, pain all over the body, giddiness, supra-orbital headache, general weakness, gastro-intestinal disturbances and slow rise of temperature, etc. History of old healed chancre, etc., was more or less present in all these cases.

Total number of cases, 8 (43 to 50).

All the symptoms in the above cases disappeared completely in a short time under treatment.

Observations.

The compound, sulpharsenobenzene as supplied to us by Dr. Brahmachari, has been tried by us in various stages of syphilis in which its specific action was remarkably manifested on the localised lesion, which generally healed up after a few injections. The constitutional symptoms disappeared and the Wassermann reaction became and remained negative during the period of our observation, which generally extended over a period of four months. During treatment the general health of the patient improved and there was gain in weight and anæmia disappeared. Our observations lead to the conclusion that this compound is non-irritant and there is very rarely any sign of intolerance as indicated by salivation, dermatitis, etc. No induration or abscess was noticed in our cases at the seat of injection.

In two cases the Wassermann reaction remained positive after a course of treatment with more than 6 grammes and the treatment is still continued. As the treatment is painless, most of the cases were treated in the outdoor department. The patients attended to their daily duties without any inconvenience and the difficulties of accommodating them into hospital as indoor patients was very rarely felt.

Sulpharsenobenzene prepared for the first time in India in the Brahmachari Research Institute, Calcutta, has been found by us to be a powerful specific in the treatment of syphilis in various stages of the disease. Further observations are in progress.

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Table showing treatment with sulpharsenobenzene and its effect on the Wassermann reaction in 50 cases.

	Case No.	Total quantity injected in grammes.	Total number of injections.	Duration of treatment.	Periods during which Wassermann reaction was negative and remained same.	Period of observation since beginning of treatment up to end of observation.
Group I.	1	1.4	6	21 days	3½ months	4 months.
	2	2.1	5	15 „	3½ „	4 „
	3, 4	3	8	30 „	3 „	4 „
	5	3.6	9	30 „	3½ „	4 „
Group II.	6	3.2	9	30 days	3½ months	4½ months.
	7, 8	4.2	12	45 „	3 „	3½ „
	9	3.6	10	36 „	3 „	4 „
(*a*)	10	1.4	6	20 days	3½ months	4½ months.
	11, 12, 13	3.2	9	30 „	3½ „	4½ „
	14, 15, 16 17, 18.	4.2	12	45 „	3 „	4½ „
(*b*)	19	1.4	6	20 days	3½ months	4 months.
	20, 21	3.6	10	36 „	3 „	4 „
	22, 23, 24	4.2	12	45 „	3½ „	4½ „
	25	6.2	15	60 „	2½ „	4½ „
Group III.	26, 27	3.2	8	30 days	3½ months	4½ months.
(*a*)	28	4.2	10	45 days	2½ months	4 months.
	29	5.4	12	60 „	2½ „	4 „
	30	6	13	54 „	2½ „	4 „
	31	6.8	15	60 „	W. R. positive	W. R. positive.
(*b*)	32	3.2	8	30 days	3½ months	4 months.
	33	4.2	10	45 „	2½ „	4 „
(*c*)	34	1.5	6	21 days	4 months	4½ months.
	35, 36	6	13	54 „	2½ „	4½ „
(*d*)	37, 38	3.2	8	30 days	3½ months	4½ months.
	39	4.2	10	45 „	2½ „	4 „
	40	5.4	12	50 „	2½ „	4 „
(*e*)	41	3.2	8	30 days	3½ months	4½ months.
	42	6.8	15	60 „	W. R. positive	W. R. positive.
Group IV.	43, 44	3.4	9	30 days	3 months	4 months.
	45, 46	4.2	10	36 „	3 „	4 „
	47, 48, 49	5.2	13	52 „	2½ „	4½ „
	50	6	14	62 „	2 „	4 „

A Mirror of Hospital Practice.

A CASE OF MULTIPLE OSTEOMATA.

By NAND LAL BAJAJ, L.S.M.F. (Punjab),
Officer-in-charge, Settlement Dispensary, Chhanga Manga (N. W. R.), District Lahore.

In my opinion, the following case of multiple osteomata is a rarity and deserves to be published in your journal for the interest of the medical profession:—

B., aged 17 years, a resident of Surah Post Office, District Sheikhupura, and a beggar by profession, presents the following skeletal abnormalities:—

A small bony eminence on the coracoid processes of the right and left scapulæ. A diffuse swelling of the upper end of the left humerus. The left ulna is bent so as to form a definite curve, and shows a diffuse bony eminence on its upper end. The left radius is also slightly bent about its middle, and on the front of the lower end of the left radius are three bony growths.

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There is also a bony projection at the junction of the upper two-thirds with the lower third of the right radius.

A conical bony projection on the posterior aspect of the lower end of the right ulna.

Small bony projections about the middle of the 5th and 7th ribs of the left side.

A diffuse swelling of the upper end of the left femur, a cubical bony projection on the front and inner aspect of the left femur, measuring superficially 4 inches by 4½ inches, and a small bony mass on the outer side of this bone.

On the inner aspect of the upper end of the left tibia there is a solid projecting mass about the size of a pigeon's egg, in the region of the lower end of the left tibia about the inner malleolus a huge bony eminence, and an exostosis the size of a walnut about the middle of the bone.

One inch below the upper end of the left fibula there is a hard diffuse swelling.

Below the right greater trochanter there is an osteoma 2 inches by 1½ inches, and about two inches above the lower end of the outer side of the right femur a bony prominence.

A protruding exostosis 5 inches by 5 inches is present on the inner aspect of the lower third of the right femur with a diffuse bony swelling immediately behind.

On the middle of the inner side of the right tibia there is an osteoma about the size of an orange, and 1½ inches above the right internal malleolus a tiny bony new growth.

On the upper end of the outer aspect of the right fibula there is a large osseous neoplasm 5 inches by 4 inches.

A hard new growth projects from the right lateral malleolus with a small osteoma about 2 inches above this point.

Lastly the second toe of the right foot is smaller than the third or fourth toes of the same side.

(*Note.*—Rearranged by the Editor, *I. M. G.*)

A CASE OF PREMATURITY WITH EXTREME DEFICIENCY IN WEIGHT.

By SYED ABDUL AZIM,
Nalua Tea Estate, P. O. Chandporebagan (Sylhet).

In connection with the following case it would be of interest to know what is the lowest recorded weight of a surviving infant.

A coolie woman, Tanti by caste, aged about sixteen years, came for treatment for malarial fever to the hospital on this estate on 23rd February, 1931. Her hæmoglobin percentage was only 40, so she was treated for hookworm as well as malaria, and on 2nd April, 1931, her hæmoglobin percentage had risen to 60.

On the morning of 5th April, 1931, I was informed that the woman had given birth to a child during the night. I weighed the child on 7th April, 1931, and found it was only 1 lb. 10 oz. in weight. The mother, who has remained living in the coolie lines, has had practically no milk since her confinement, and the child who had no power to suck milk from a feeding bottle was consequently given milk with a piece of cloth. In addition to milk, Virol was also given regularly. The child had constipation for about two months; this was treated with liquid paraffin and castor oil.

On 6th June, 1931, the child was attacked with malarial fever which was treated with quinine in Virol and by rectal injections of quinine.

In spite of such poor weight, premature birth at about seven months, constant constipation and an attack of malarial fever, the child has improved steadily in general health and weight, as may be seen from the following table. The weighings were checked by the visiting medical officer, Dr. R. A. Murphy.

Date.	Weight.	
	lb.	oz.
7-4-31	1	10
16-4-31	2	1
30-4-31	2	7
14-5-31	2	12
28-5-31	3	4
11-6-31	3	8
25-6-31	4	3
9-7-31	4	8
23-7-31	5	2
6-8-31	5	14

ECTOPIA VESICÆ.

By G. D. MADHOK, L.C.P. & S. (Edin.), L.R.F.P. & S. (Glas.), L.M. (Dub.), D.P.H., D.T.M. (L'pool),
Jafferbund.

The following case seems of sufficient interest to record, since such cases are rarely met with in general practice.

The patient was a boy, 5 years old. There was total absence of the anterior wall of the bladder and of the lower portion of the abdominal parietes, as a result of which the mucous membrane of the posterior vesical wall was exposed and rendered somewhat prominent by the pressure from behind of the abdominal contents. This surface was irregular, and covered with papilliform processes. The orifices of the ureters were easily recognised below, and urine was occasionally emitted from them in forcible jets. He was in great distress, not only from the constant dribbling of urine causing excoriation and eczema of the thighs and surrounding parts, but also from the pain and irritation due to friction of the clothes against the exposed mucous membrane. His clothes were always wet, giving him an unpleasant urinous odour. The penis was cleft, small and stunted, and in a condition of complete epispadias; it was drawn upwards and backwards over the trigone, so that it required pulling down to expose the ureteral orifices. The symphysis pubis was absent, and the horizontal ramus of the pubic arch terminated on either side in the inguinal region. The testes were in the scrotum, but unaccompanied by congenital herniæ.

The patient was fitted with a urinal.

A CASE OF ALEUKÆMIC MYELOSIS.

By G. H. FITZGERALD, M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.T.M. & H. (Lond.), D.P.M. (Cantab.),
CAPTAIN, I.M.S.,
Civil Surgeon, Kamrup, Assam.

I venture to present this case, admittedly incomplete, since it presents certain features of considerable interest, in the hope that others who have noted cases showing similar features may be tempted to discuss the tentative diagnosis.

A Nepali woman, aged 20, was admitted to the Sadr Hospital, Gauhati, complaining of splenic enlargement and a swelling in the upper part of the abdomen. This enlargement, she stated, had started about a year previously and had gradually increased, and there had been moderate attacks of fever at intervals. Her appetite was poor. Menstruation which commenced at

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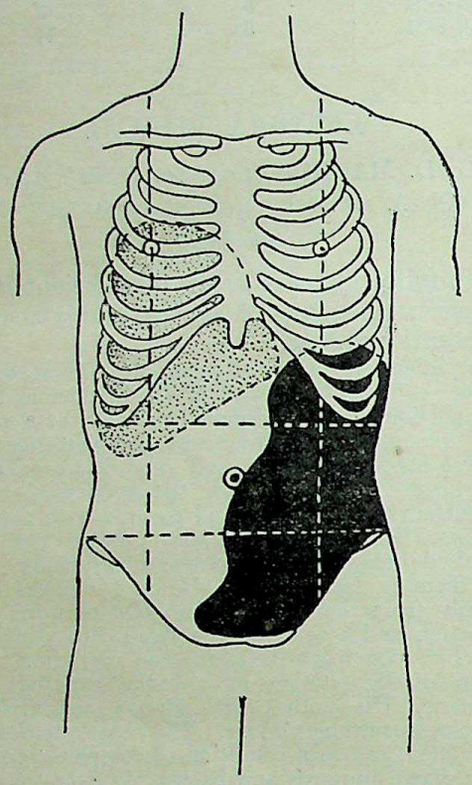
the age of 17 had ceased about a year ago. Although married five years, she had not conceived. Five or six months prior to admission she had had an attack of dysentery, probably bacillary. On examination she was pale, emaciated and somewhat breathless. Slight icterus was present. The heart sounds were normal save for a systolic bruit over the pulmonary area, probably hæmic in origin. The lungs were clear, and the tongue clean. The abdomen was greatly distended by a massive spleen hard to the touch and extending to within one inch of the pubic symphysis and across the middle line. The liver was also much enlarged and somewhat tender (*see* figure). The lymph glands were not enlarged. There was considerable epigastric discomfort. There was, as far as could be detected without puncture, no free fluid in the abdomen.



The urine was dark in colour and contained a small and persistent quantity of albumen.

The fæces showed hookworm ova in fair quantity; no cysts were seen.

The formol-gel test was negative and liver puncture failed to show leishmania.

No malarial parasites were seen, even after the administration of adrenalin.

Blood examination.

Hæmoglobin, 60 per cent.

Total leucocyte count, 5,300.

Differential count:—

	Per cent.
Polymorphonuclears ..	.. 46.5
Lymphocytes ..	.. 33.0
Monocytes ..	.. 9.0
Eosinophils ..	.. 6.5
Mast cells ..	.. 2.5
* Meta-myelocytes ..	.. 2.5

The myelocytes were all neutrophilic. One megaloblast and two normoblasts were seen during a count of 300 leucocytes.

The Arneth index was 84.5, as against a normal of about 62.

Taking granular and non-granular leucocytes, we get 58 and 42 per cent. respectively, showing thus a definite balance in favour of the granulocytes, which is borne out by the presence of immature cells of the myeloid series.

Clinical course.

The patient unfortunately remained in hospital only ten days. *X*-ray treatment was proposed, for which a journey to Shillong would have been necessary, and rather than face this, the patient absconded. During this period her temperature (axillary) rose in the evenings fairly regularly to 100°F., on one occasion it went to 101.2°F., when she was said to have had a rigor.

Respiratory embarrassment became rather more marked and the liver increasingly tender.

Beyond dealing with her hookworm infection, only symptomatic treatment was given.

Comments.

The condition is far from common and the patient's untimely departure prevented us from carrying out many investigations which would have been of value.

A series of blood examinations taken over a period of time would have shown whether this was merely an aleukæmic interval in the course of a leukæmic myelosis or a true case of the much rarer aleukæmic type. Nor was an examination of the fundus oculi performed.

The patient's home is in a remote corner of another district and it is unlikely that she will again seek orthodox medical aid.

The relative paucity of immature white cells, and these of a type most nearly approaching normal (coupled moreover with the marked deviation of the Arneth index to the left) appears to be of good prognostic importance. It has been shown by Szilard that in true aleukæmic cases the white cells are less resistant to the lytic action of their own serum or to that of a case of leukæmic myelosis, than are those from a case of true leukæmia. This phenomenon was not investigated but it seems evident that cell destruction was not progressing to any marked extent, otherwise myelocytic forms would have been seen in greater abundance. Against the assumption, however, that the case was one of the leukæmic type during an aleukæmic interval, is the progressive splenic enlargement, which is generally stated to decrease during these remissions.

The absence of any history of hæmorrhage seems again a favourable sign, unless the dysenteric attack was really of this nature.

A point of some interest is the influence, if any, of ancylostomiasis in the production of these abnormal blood states. Were the nucleated red cells present as a result of the helminthic infection or of the leukæmia? Are blood pictures such as this relatively common in highly malarial areas?

These are questions on which a more experienced hæmatologist than myself might perhaps be able to throw some light.

* That is, the fully granular but mononuclear stage of the polymorphonuclear leucocyte in which the nucleus has lost the round outline of the myelocyte and become indented.

REFERENCE.

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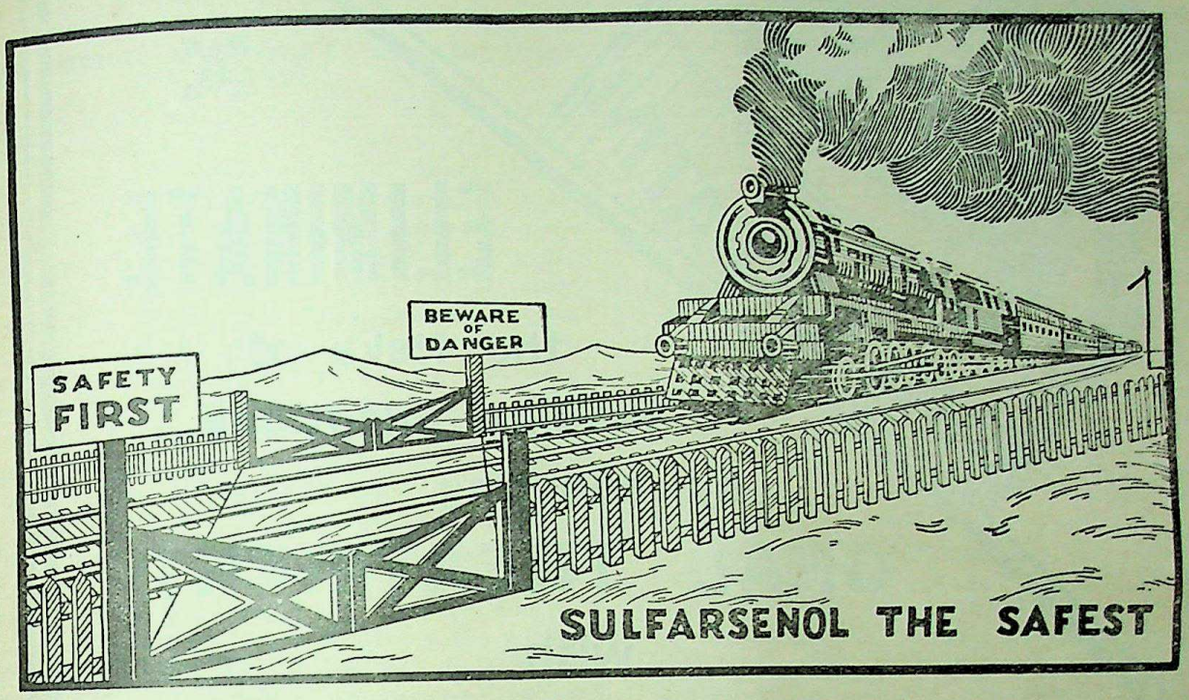

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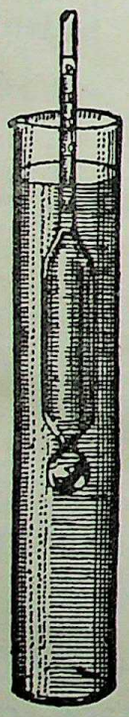

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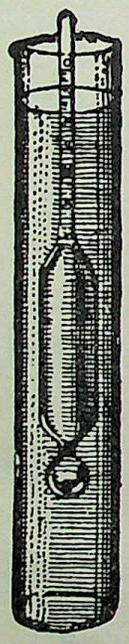

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Indian Medical Gazette.

NOVEMBER.

THE THREAT TO MEDICAL ORGANISATION IN INDIA.

EACH individual no doubt feels that his case is a special one—as it of course is from his own point of view—and that when others undergo "cuts" he should be spared, but the majority also recognises that in times of great need everybody must be prepared to make sacrifices, both personal and departmental. The medical department being labelled as non-productive forms an easy mark for the retrenching axe. The physician, the sanitarian and the research worker do not produce goods which can be sold for hard cash; they only save human lives. To the individual a human life is above the price of gold. How many fathers, brothers, husbands would accept any sum, even a year's pay, in exchange for the life of one of those dear to them? But this is not the case with governments: a human being is only worth what he can produce for the government to tax. We do not mean to suggest that governments are altogether ruthless, or that they are entirely blind to the repeated demonstrations of scientists that health and wealth are closely associated, nevertheless it is obvious that in their heart of hearts they have not really been convinced; while there is money to spare they have pacified our clamourings, but immediately the pinch is felt the medical services are again labelled "non-productive", and are given the earliest attentions of the retrenchment committees.

An example of the retrenchments that are being effected is the cut of two-thirds of the income of the Indian Research Fund Association. Medical research in India has, during the last few years, been endowed, not perhaps lavishly, but sufficiently. Starting with a small nucleus of highly-trained officers, both European and Indian, mainly the former, an efficient personnel of trained research workers has gradually been evolved. At the last conference of research workers in Calcutta the Director-General told us that there were 11 European and 62 statutory Indian whole-time research workers employed under the Indian Research Fund Association. A few of these have been imported from Europe and America, but it is obvious from the composition of this personnel that almost all have been recruited and trained in India. Under the auspices of this Fund much very valuable research work has been done, but probably no part of the work has been so important as the training of this personnel which in a few years' time will make medical research in India almost independent of outside assistance. We say 'almost' because, though the time may not be far hence when the heads of the department will be Indians, we cannot foresee a time when India will be able to afford to be entirely independent of the scientifically-more-advanced West. We understand that the 'cuts' in the research grant will necessitate the discontinuance of a number of enquiries and the cutting down of nearly all the others. Whilst we realise that the national emergency necessitates these drastic economies we sincerely hope that every endeavour will be made to maintain the research *personnel* intact. The employment of new recruits to maintain this personnel at its present inadequate—as far as India's *real* needs are concerned—strength is desirable, but we realise that this must be foregone; it would, however, be a national disaster if many of the specially-trained medical research workers were lost, and the efforts of the last 12 years in training personnel entirely wasted.

However, by far the most serious threat to the present and future of medicine in India is the suggestion, made by the General Purposes Sub-Committee on Retrenchment of the Government of India, that the posts of the Director-General of the Indian Medical Service and of the Public Health Commissioner should be abolished, and that these two departments should be represented by two junior officers, designated Medical Adviser and Public Health Adviser, respectively, to the Government of India.

The actual cost of whole of these two departments is less than three lakhs of rupees so that if this suggestion is carried out the immediate saving, even on paper, will be negligible; the result will, in our opinion, be a considerable financial loss on the medical stores department alone, and the complete ship-wrecking of medical organisation, in all its branches, in India.

We cannot believe that the Government of India will act upon this preposterous proposal, nor do we consider that the members of this retrenchment committee can have appreciated the extent of its implications. This committee is a body of very able men, but it is a non-expert body which was asked to perform a heavy task in a very short time. They had therefore insufficient time to consider the evidence of the various experts that were called. This, at least, is the only explanation that we can offer. If a shipping company decided that they would dispense with the service of their captains and chief engineers and that in future their ships would be navigated by the board of directors in consultation with a junior officer, who would explain technical points to them, it is doubtful if the experiment would be more dangerous than the one proposed by this committee.

The name 'Director-General, Indian Medical Service' is in some ways a misnomer; at least, it is insufficiently comprehensive. His duties are far wider than the name implies; he not only directs the policies and administers the personnels of the Indian Medical Service and

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the Indian Medical Department, but his office combined with that of the Public Health Commissioner institutes a small Ministry of Health for India.

The medical questions on which the Government of India is continually requiring expert advice are far too numerous for us to attempt to detail here; they include international medical questions, the medical research policy in India, the quinine policy, the control of the manufacture and sale of drugs, medical questions affecting jails and mental asylums, standards of medical education, the co-ordination of medical work in the various provinces and in the army department, and the control of the Medical Stores Department. In addition to this we can count at least a dozen committees of institutions or associations, which the Government of India partly or wholly finances, on which the Director-General serves, usually as president.

It might be argued that the time is not far hence when there will be no civil Indian Medical Service or Indian Medical Department. Let us assume, for the sake of argument only, that this eventuality—very undesirable in our opinion—is likely to come about within the next few years. Even then only a comparatively small portion of the duties of the Director-General would disappear and if there is to be a Federal Government it will require its own medical advisers and a central medical organisation even larger than the existing one. If there is to be a reorganisation of the medical services in the near future, it is surely a time more than any other when the services of a senior and experienced officer will be required.

Everybody, whatever his political creed, interested in the future of India's medical welfare must see the necessity for a strong medical representative at the centre. At present this representative is known as the Director-General, Indian Medical Service; in time the name may be changed, but the powers of the holder of this office must not be decreased. At present, again, the occupant of this office is an exceptionally able European officer; the time may not be far hence when it will be held by an Indian, possibly even a non-official Indian. On the plea of *economy* it is recommended that this office be abolished; once abolished there will be practically no chance of its re-establishment, until the complete disorganisation of all medical services in India leads to some disaster, as in time it assuredly will. We know that this sort of economy is not worth while; we sincerely hope that others will see the problem from our point of view and that this disastrous experiment will never be made.

The case for the retention of the Public Health Commissioner is quite as strong. His duties *in* India are nearly as multifarious and as important as those of the Director-General. The secretary-ship of the Indian Research Fund Association is alone one man's work. In addition to this there is India's representation on the Health Committee of the League of Nations. Major-General Graham has, during the last few years, placed this country very firmly "on the map", as regards international medicine and public health. India has ceased to be the butt of other nations; she is no longer considered to be a plague spot, the home and starting point of all epidemic diseases. Other nations now know what we are doing to deal with our epidemic diseases and what we propose to do in the future. It is not sufficient to tell the world about these things; almost anyone could do that. The difficulty is to get them to listen, and General Graham has acquired the knack of doing this; partly on account of his personality, but mainly because of the position he holds in India. Representatives of other nations are not likely to listen in the same way to a junior officer or simply some officer who happens to be on leave in Europe at the time. The inevitable result of the abolition of this post would be that India's case in health matters would be ill-represented and that she would run a grave risk of relapsing into the unenviable position, not only of being the object of grave suspicion among the other nations, but of having her overseas trade subjected to quarantine restrictions which would seriously affect her commercial interests.

PLASMOQUINE AND MALARIA CONTROL.

A METHOD of malaria prevention which has not found much favour in the past is the direct attack on the malarial parasite itself. One of the main reasons for the neglect of this method of attempting to break the vicious circle of malaria transmission has been the extreme inadequacy of the weapons at our disposal. Quinine will destroy the asexual forms of the malarial parasite fairly readily, and thus cut short the malarial attack, but the course of treatment necessary to destroy the sexual forms—which are the only forms that matter as far as transmission is concerned—is so long that there is little hope of subjecting even a small community to a routine treatment which is likely to have any appreciable effect on the general gametocyte supply in the vicinity. Some workers have found that in the case of malignant tertian malaria quinine actually increases the formation of gametocytes, though the claim that this is the general rule is not universally supported. Again, though prophylactic quinine has been used extensively both in the army and elsewhere there is strong experimental evidence that its administration even in moderately large doses will not protect man from malarial infection. It is little wonder, therefore, that in the past, when devising anti-malarial schemes, the sanitarian has turned away from the pharmacist and has looked to the entomologist and the malarial

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engineer as his only hope of obtaining assistance. However, the introduction of plasmoquine has thrown a heavy weight on the pharmacist's side of the balance and has made it advisable that many problems should be re-weighed under the new conditions. One of the reasons why plasmoquine is such a particularly effective weapon is that it attacks the malarial gametocyte at three points; it destroys the gametocytes in the primary host, it prevents development in the mosquito of those that escape destruction, and recent work has now shown that it will prevent the development of the parasite in the prospective host.

On the gametocyte-destroying powers of plasmoquine an enormous volume of work has been published; to mention recent work in this country, Knowles and Das Gupta have shown that a dose of 0.06 gramme of plasmoquine, given in 6 doses over a period of three days, will clear the blood of crescents. The practical significance of this is considerable; given in these doses the drug is not toxic, the cost for such a small quantity would not be a serious matter, and the reduction in the number of gametocytes available for infecting mosquitoes would be very great, if this course of the drug were administered in all cases of known malaria in an isolated community. In a group of tea estates in Travancore where Colonel Clemesha is the advising malariologist this property of plasmoquine has been put to practical use and anti-gametocyte measures have been adopted as a routine, in conjunction with other anti-malarial measures. A report on his work was published in the December 1930 issue of the *Indian Medical Gazette*, and in our present issue there is a further report on the progress of this scheme. The anti-malarial measures—mainly anti-larval measures and quinine administration—previously adopted had controlled malaria in most of these estates to a very considerable extent, but the introduction of plasmoquine has now reduced it to negligible proportions.

Barber, Komp and Newman were the first to draw attention to the 'sterilizing' action of plasmoquine on the gametocyte; they showed that when exceedingly small doses of plasmoquine, 0.005 gramme, were given to the patients, the gametocytes though not destroyed were affected in such a way that they did not develop in the mosquito. This property of sterilizing the gametocytes is not shared by quinine, as, even if a patient takes 10 grains three times a day over a long period, though this will protect him from a malarial paroxysm it will not, in the case of a *Plasmodium-falciparum* infection at any rate, prevent the mosquitoes in the neighbourhood which feed on his blood from becoming infected and transmitting the infection to another person.

Finally, it appears that plasmoquine may prove to be of some practical value as a personal prophylactic, another rôle in which quinine has proved useless. Yorke and Macfie have shown that quinine taken in comparatively large doses—10 grains daily for 5 days before, and 9 days after, the infecting bite, or 30 grains daily on the day of, and for two days following, the bite—will not afford protection against a malarial attack. The recent experiment of James, Nicol and Shute in London—for the conception and mode of execution of which the authors received their reward of widespread and very inaccurate reporting in the public press—showed that 0.42 gramme of plasmoquine, given in doses of 0.02 grammes three times a day for 7 days, starting on the day before the infecting bite, would protect a man from an attack of malaria. Apparently none of the heroes of this quixotic experiment suffered any ill-effects, but the dosage was not only bordering on the toxicity line, but was seven times as great as that which Knowles and Das Gupta found sufficient to clear the blood of gametocytes; such a dose is out of the question for practical prophylactic purposes; furthermore, only one species of parasite, *Plasmodium vivax*, was used. The motto in this particular experiment was apparently, and quite rightly, "safety first," but we hope that no time will be lost in repeating the experiment, using much smaller doses of plasmoquine at much longer intervals and as the human subjects, not healthy persons to whom the infection might be a troublesome and even dangerous incident, but mental patients who would be benefitted by a malarial attack should the protection prove inadequate.

Plasmoquine has suffered, as so many valuable drugs have suffered in the past, from the over-enthusiasm of its champions. Ridiculous claims of its efficacy were made, it was administered in dangerous and unnecessarily large doses, and, most serious of all, its activities were misdirected; it was used as a specific in the treatment of the malarial attack, a rôle in which it is much inferior to quinine, as on the asexual forms of *Plasmodium falciparum* it has practically no action at all.

There seems to be little doubt that the administration of plasmoquine and quinine will produce a more rapid disappearance of the parasites—whatever the species—from the blood of malarial patients, than either drug separately, and Sinton has shown that given in comparatively large doses plasmoquine alone will produce a much higher permanent-cure rate in benign tertian infection than quinine alone and that by the addition of quinine an almost cent-per-cent permanent cure can be expected; these results compare very favourably with the 30 per cent. permanent-cure rate of the cinchona alkaloids. To produce these high cure rates the doses have to be comparatively large, and toxic symptoms are not unknown, so that at present it is advisable that in these

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doses the drug should only be used under careful medical supervision.

The incidence of toxic symptoms when larger doses of the drug are given and the observation that in order to develop its action to the full extent quinine must also be administered have given the critics of the therapeutic properties of plasmoquine an opportunity to compare it unfavourably with quinine, and we almost forgive the old gentleman who says, from his arm-chair in London, "I myself have employed quinine for 30 years and am satisfied, etc., etc."; in the treatment of the malarial attack plasmoquine is *not* a substitute for quinine, though in certain cases it is an excellent adjuvant, but anyone who dismisses this drug with a criticism of its therapeutic properties is either ignorant of the literature on the subject or is incapable of grasping the significance, from the viewpoint of the malariologist, of the work that has been done on the rôle of this drug in a field where quinine is quite useless.

At a meeting of the Industrial Antimalarial Advisory Committee of the Ross Institute held in London on December 16th, 1930, Sir Malcolm Watson is reported to have said, "It was claimed for plasmoquine that it kills the sexual forms of the malarial parasite, those that infect the mosquito. These, however, vary in numbers in the blood from day to day so much that great care has to be exercised in drawing conclusions from experimental work." (To us it seems possible that some of the many very eminent research workers who have tackled this problem may have thought of this too !) "Much more detailed work is required before any conclusions can be drawn from the laboratory work, and the Americans themselves decline to draw *final conclusions*" (our italics). From the résumé of the report of this meeting it is not clear who these "Americans themselves" are, but we certainly applaud their caution. Who amongst us would be willing to draw *final conclusions* regarding the action of the cinchona alkaloids ? Sir Malcolm's summing up of the matter is reported as follows:—"It seemed to him they should, therefore, suspend judgment on the value of plasmoquine *plus* quinine in the meantime, until more was known of its action on the human body, and careful field experiments had been done." These extremely guarded remarks would have been in order five years ago, but the literature on plasmoquine now runs to 400 articles in scientific journals and judgment cannot be suspended for ever. Plasmoquine is not going to solve all malarial problems, it is probably not going to solve one-tenth of them, but its advent has placed an entirely new weapon in the hands of the malariologist and the sanitarian. It should be borne in mind that retrogressive pronouncements coming from the Ross Institute and Hospital for Tropical Diseases, an institution which enjoys a high reputation—especially amongst the laity—in matters connected with malaria control, are likely to embarrass practical malariologists who attempt to keep abreast of the times.

ABBREVIATIONS AND SYMBOLS.

ABBREVIATIONS, like alcohol, are good servants but bad masters; used in the right way, at the right time, they are not only helpful but necessary, used intelligently and in moderation they are harmless, but used lavishly and indiscriminately they are very definitely objectionable. Medical men appear to be amongst the worst addicts of the abbreviation habit; presumably they acquire it during their note-taking student days, and in later life the necessity for making records of their cases, hurriedly and in small note books or on small cards, and the writing of prescriptions prevent their throwing it off. In India the habit is very deeply rooted. Recently we suggested that for the abuse of initial capitals official reports could probably be blamed; in the case of the abbreviation habit we are inclined to think that official correspondence and the indent have been the corroding influences; indenting for "buckets, G. I.—4" or "tents, E. P. I. P.—1" is probably the best way to obtain four galvanized-iron buckets or a tent of a particular pattern suitable for the use of European personnel in India, because the few persons who will read the indent and those from whom the articles are to be obtained know them only by these names, but when contributing to a medical paper the writer must overcome his natural modesty and try to visualize a wider circle of readers, including even persons in foreign lands who, though familiar with the English language, may have no idea that "the case had K. A. and was treated with U. S." means that "the patient was suffering from kala-azar and was treated by injections of urea-stibamine".

It may be taken as a general rule that in the text of a paper abbreviations should be avoided; there are of course a few exceptions. It would, for example, be wrong to write *videlicet*, or *exempli gratia* instead of the abbreviations *viz.* and *e.g.*, because the extended forms are not now used, and in the case of the former it is doubtful if many readers would grasp the significance of the word. Again if we wrote "the patient's temperature rose to one hundred degrees Fahrenheit", it would not convey the meaning to the reader nearly as rapidly as would "the patient's temperature rose to 100°F." From time to time expressions appear in medical literature which are better known in their abbreviated than in their extended form. A good example is T. A. B. vaccine; another, a more recent one, is B. C. G. vaccine. It is easy to understand how the first example established itself; one could scarcely refer to typhoid-paratyphoid-A-paratyphoid-B vaccine. The second example is

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harder to excuse; it has now, however, been universally accepted, but it is not a good precedent. Great care should be taken to avoid abbreviations that are current locally or amongst a small group of specialists only; for example most leprologists, certainly those in India, understand that the initials E. C. C. O. mean ester-creosote-camphor-oil, but to the majority of readers they are a hieroglyph.

The form in which numerals should be given is a very open question. There appear to be three guiding principles; these are—that small numbers are printed in words and large numbers in figures, that a sentence should not begin with a figure, and that uniformity should be maintained. It is quite obvious that these principles will continually be in conflict with one another; *e.g.*, "Two insects died on the first day, six on the second, and 4,599 on the third" seems to be the obvious solution, but had the numbers been 215, 164 and 8, respectively, one would be tempted to change the sentence round so as to avoid beginning with the numeral and to put all three in figures.

For money units, when expressing an exact sum, symbols should be used, but when a coin is indicated, when expressing a round figure, or when the associated number is in words, the word should be written in full. "The whole scheme was estimated to cost Rs. 1,225", but "He threw the man a rupee" and "He lost over a thousand rupees".

The symbol "%" should not be used, even when associated with a figure. "Per centum" has gone completely out of use, and the abbreviation "per cent." is now scarcely looked upon as a Latin word, it is never printed in italics, and it often appears without the stop, *e.g.*, "95 per cent cures were effected".

Terms of measurement, *e.g.*, pounds, ounces, drachms, minims, grains, feet, inches, kilogrammes, grammes, milligrammes, kilometres, metres, centimetres, litres, cubic centimetres, cubic millimetres, etc., should usually be given in full; as the last two of these examples are rather unwieldy expressions it is permissible in certain circumstances to use the common abbreviations, but even here "Ten cubic centimetres" is often a better form than "10 c.cm.", especially at the beginning of a sentence; "10 cubic centimetres" is hard to justify, whereas "ten c.cm." is inexcusable.

Titles are given in the abbreviated form when prefixed to the name, "Dr. Smith took his degree in 1930", but not otherwise, "Smith became a doctor in 1930"; "Doctor Smith" would be as incorrect as "became a Dr. in 1930". The rule cannot be applied quite so rigidly to honours, degrees, etc. following a name: it is more correct to write "he is a Fellow of the Royal College of Surgeons" than "he is an F. R. C. S.", though the latter is the commoner form; but "he is Medicinæ Doctor", for "he is an M.D.", would be pedantic, and "he is a Doctor of Medicine" might not convey the same idea.

There are some abbreviations, very dear to contributors to medical journals, that cannot be allowed to appear in the text; examples of these are "M. P." for "malarial parasite", "W. B. C." for "white blood cell", "poly." for "polymorphonuclear leucocyte", "W. R." for either "Wassermann reaction" or "Widal reaction", and "I. K." for "interstitial keratitis". The habit is slovenly and unnecessary; it does not aid the reader and it may hinder him. He has to decide whether "W. R." means "Wassermann reaction" or "Widal reaction", though admittedly the context will usually indicate whether "M. P." means "malarial parasite" or "Member of Parliament". The space saved by substituting "W. B. C." for "white blood cell" is negligible and the reader who pronounces the words as he reads them—either mentally or aloud—will not find it any quicker to say "Double-you bee see" than "white blood cell".

Chemical and mathematical symbols are a great temptation to a certain class of contributor. "He then drank a glass of H_2O" is not unknown, though an extreme example. "He was ordered to take no NaCl with his food", "he was given increasing doses of KI for a week", and "the test gave a + result" are common, but inexcusable in medical literature.

Abbreviations may be used freely in diagrams, charts and tables; in diagrams and charts, if the full words were written they would often have to be so small that it would be difficult or impossible to read them, and in the same way in tables abbreviations are essential in order to keep the size of the tables within reasonable bounds. Even here great care should be taken that the full meaning is conveyed to the reader, and, in cases where abbreviations other than those universally accepted* are used, an explanatory footnote must be added. It is not sufficient

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*A short list of abbreviations and symbols, which are generally accepted as being suitable and to which for the sake of uniformity in this journal contributors should adhere, is appended:—

Milligramme	= mgm.
Gramme or grammes	= gm.
Kilogramme	= kgm.
Metre	= m.
Centimetre or centimetres	= cm.
Micron (or 1/1,000th of a millimetre).	= μ.
Millimetre	= mm.
Cubic centimetre	= c.cm.
Cubic millimetre	= c.mm.
Kilometre	= km.
Grain or grains	= gr.
Minim	= min.
Ounce	= oz.
Pound	= lb.
Inches	= ″.
Feet	= ′.
Degrees Fahrenheit	= °F.
Degrees centigrade	= °C.
Male = ♂	Female = ♀.

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that an explanation of the abbreviations will be found in the text; diagrams, tables and charts should be made, as far as possible, even at the risk of repetition, completely self-explanatory.

With regard to prescriptions contributors frequently exhibit extreme carelessness; they write them half in Latin and half in English, and they use the most unjustifiable abbreviations. Dispensing chemists are no doubt hardened to "Tn. Dig.", but in a scientific paper it should appear as "Tincturæ digitalis", or at least as "Tinct. digitalis". The symbol "℞" for "recipe", *i.e.*, take, is not only justifiable, but on account of the mythological significance of this symbol it is preferable; for grains, drachms, minims, etc., the abbreviations can be used, though it is better to write in full "three times a day, after meals", than "t.i.d., p.c.".

Again in reporting the pathological findings in a paper abbreviations should be avoided as far as possible. It is all very well for the busy pathologist to scrawl "R. B. C.—5,000,000" "L. M.—21 per cent." or "L. D. pres." on his report, but for purposes of publication this must be translated into "Red blood cells—5,000,000 per c.mm.", "Large mononuclears—21 per cent." and "*Leishmania donovani* were present".

Finally, contributors should remember that, as a paper is sent to press, so it appears in print; mis-spelt words do not correct themselves, wrongly-used capitals do not shrink to lowercase letters, roman figures do not convert themselves into italics, nor do abbreviations elongate themselves, unaided and mysteriously, during the process of being set up in type. When a carelessly prepared paper acquires a certain amount of polish between the time it is posted and the time it appears in print, it is usually because the editor has spent many hours correcting and re-correcting it. As astute clinical observers and accurate research workers are not necessarily masters of the English language, very frequently the editor does not grudge the time spent; but editors are human, and usually busy men, so that when the choice lies between a paper that is ready for the press and one that has to have some hours spent on it, they are liable to choose the former.

NOTICE.

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Medical News.

INTERNATIONAL CONGRESS OF TROPICAL MEDICINE.

SIR,—The Executive Committee of the Second International Congress of Tropical Medicine—to meet in Amsterdam, September 12th to 17th, 1932—have the honour to bring to your notice the following information:—

The main subjects to be discussed are:

1. Avitaminoses, with special reference to beri-beri.
2 (*a*). Yellow fever and 2 (*b*) Leptospiroses.
3. Helminths, with special reference to Ankylostoma.
4. Malaria, with special reference to Blackwater Fever.

The Committee have invited reporters for each separate subject. The reports are to be discussed in general meetings. At the section-meetings, to be held at other hours, there will be opportunity to discuss other subjects.

Those desirous to participate in the Congress are requested to notify their wish to become a member of the Congress as soon as possible, and not later than December 31st, 1931. This notification should be addressed to the general secretary and to the local secretary, mentioning the exact address.

Participants are requested to pay their subscription fee of £1 (Dutch guilders 12) at the International Congress of Tropical Medicine, Nederlandsche Bank, Amsterdam, on receipt of which the certificate of membership will be forwarded to the members.

Those wishing to read a paper are kindly requested to notify their intention to the general secretary, as soon as possible, adding the exact title of the paper.

Abstracts not exceeding one page in print are awaited before the 1st of April 1932. The paper itself is not to exceed 16 printed pages and is to be handed in to the respective secretaries on the day it is read.

All languages are allowed at the Congress.

For purely practical purposes the Committee beg the speakers to confine themselves, if possible, to English, French and German.

In the Transactions the papers will be printed exclusively in the language they are composed in.

The time allowed to official reporters is fixed at 45 minutes, to official participants in the discussion of those reports at 15 minutes, to other participants in the discussion at 5 minutes each.

At the section-meetings the time allowed for a paper to be read is 20 minutes, for the discussions 5 minutes each.

For the Executive Committee,
(Sd.) E. P. SNIJDERS,
General Secretary.

AMSTERDAM:
August 1931.

THE INTERNATIONAL HOSPITAL ASSOCIATION.

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Official Organ.—"NOSOKOMEION".
Quarterly Hospital Review.

Editorial Staff.—W. Alter, Düsseldorf. E. H. L. Corwin, New York. A. Gouachon, Lyon. R. H. P. Orde, London. R. Sand, Paris.

Publishers.—W. Kohlhammer, Verlag, Stuttgart.

At the close of the Second International Hospital Congress which met in Vienna from June 8th to 14th, the representatives of the 41 countries participating in the Congress voted unanimously to organize an International Hospital Association.

The purpose of the Association is to bring about an international exchange of opinion and international co-operation in all problems and in all fields of hospital

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work and in all relationships, economic, sociological and hygienic. The Association is composed of two classes of members: ordinary members, consisting of national hospital associations, and associate members.

These comprise two groups of persons interested directly or indirectly in hospitals: one consists of individuals associated, in some way or another in hospitals or cognate institutions; the other will be representatives of firms or organizations standing in a business relationship to the hospitals, such as architects, builders, manufacturers of hospital supplies, merchants and the like.

The associate membership in the International Hospital Association entitles the members not only to a free copy of the "Nosokomeion," the official organ of the Association, and to full participation in the International Hospital Congresses, but above all to participation in the work of the 10 permanent committees. These committees under the leadership of recognized specialists in various fields will devote their time in working out standards for the guidance of the hospital field throughout the world.

The annual subscription for associate members of the first description is $5, and for the second $10.

The Secretary-General and Treasurer beg to appeal to all those interested in the proper care of the sick to become associate members. Applications may be sent directly to the officers of the Association or to any member of the Executive Committee whose names appear above.

Current Topics.

Acute Mercury Poisoning: Report of Twenty-One Cases with Suggestions for Treatment.

By B. I. JOHNSTONE, B.SC., M.B.

(Abstracted from the *Canadian Medical Association Journal*, Vol. XXIV, No. 4, April, 1931, p. 500.)

BICHLORIDE of mercury is by far the commonest compound causing acute poisoning. It was the drug responsible in 18 of the 21 patients reported. It is soluble in water, alcohol and particularly in solutions of common salt and other alkaline chlorides; with albumin a compound is formed which is insoluble in water but soluble in an excess of fluid albumin. It is commonly prepared in blue tablets containing 7.3 grains or 1.82 grains. Mercury bichloride is also used in the preparation of some cosmetics and many liquid insect destroyers.

The majority of our patients were young adults, the oldest being 56 and the youngest 22, with an average age of 30.8 years. There were twice as many females as males, and all but one were of the white race. In four, poisoning was definitely accidental, while six admitted having taken the drug with suicidal intent. In the remainder definite information was not obtainable, but it was believed that the majority had attempted self-destruction. Poisoning in cases Nos. 1 and 21 was due to the use of bichloride solution as a douche. Both of these patients died. More recently, poisoning from this source has become less common, partly because the medical profession has finally realized the danger connected with the promiscuous use of bichloride of mercury, and, moreover, the public is becoming better educated as to its poisonous properties.

The lethal dose of mercury bichloride is usually estimated as from 3 to 5 grains for the average adult of 70 kilograms. This would be 2.7 to 4.6 mg. per kilogram of body-weight. Sansum has shown that the minimum lethal dose for a dog is 4 mg. per kilogram when given intravenously. Such small doses when taken by mouth produce death only if completely absorbed. One patient is reported to have taken 192.6 grains and recovered. Lambert and Patterson's patient died in five and one-half days after having been given 1.5 grains intravenously. This person was probably highly susceptible. Harmon has recently reported 4 patients who died in from 6 to 12 days following the intravenous administration of mercury bichloride in doses of at least 6 mg. per kilogram of body-weight.

In our patients the exact size of each dose could not always be learned, but in each instance, except two, as accurate an estimate as possible was made from the number and size of the tablets used. The largest dose was 27 grains and the smallest 0.75 grains. Of those taking the drug by mouth, all used mercury bichloride, except patient No. 7, who swallowed about 15 c.cm. of metallic mercury in a glass of whisky. In 2 patients, poisoning resulted from inunction and in 2 the portal of entry was the vagina. Patient No. 1 had been using mercury bichloride solution as a vaginal douche daily for three months before hospitalization, and patient No. 21 had used three large tablets (21.9 grains) in a single douche, 11 days before admission. Patient No. 8 had taken a daily inunction of blue ointment for 12 days for impotence, on the advice of a quack, and No. 13 had used this same compound for pediculosis pubis for 6 days before seeking treatment.

From a practical standpoint it does not depend so much upon the amount of the drug ingested as upon the amount absorbed. In the 17 instances in which the drug was taken by mouth the longest period before hospitalization was two days, and the shortest one-half hour, the usual time two hours. During this interval the amount of mercury which has entered the circulation will depend upon a number of factors. By inquiry concerning these a better estimate as to the probable severity of the poisoning can be arrived at. If the compound is soluble, or already in solution, it is absorbed rapidly and leaves the stomach quickly. If the drug is taken soon after a meal, a portion unites with the food to form insoluble mercury proteinate and this retards early absorption. Immediate administration of milk and eggs acts in a similar manner. Early spontaneous or induced vomiting may result in much of the poison being expelled. No matter the route by which absorption takes place, this begins immediately and is rapid in the early stages. When ointment is applied to the skin some observers believe that a portion of the mercury enters the circulation by way of the lungs as a vapour, and is gradually taken up from the blood and fixed by the tissues. It does not, however, soon disappear from the circulation, as is evidenced by Rosenbloom's case in which 30 per cent. of the total amount was found in the blood of a patient dying 13 days after using a bichloride douche. In the case of persons succumbing to acute poisoning the largest amounts of mercury are obtained in the liver, kidney, blood and muscle, although the metal has been demonstrated in every tissue and fluid of the body.

Mercury is excreted by the large bowel, by the kidney, by the liver, by the gastric mucosa, by the salivary glands and to a small extent by the skin. Excretion begins early and mercury may appear in the urine within 2 hours. Menten has demonstrated histological kidney changes in the rabbit as early as 5 minutes after administration of bichloride, and Johnstone and Keith have shown that these may be quite marked in 1 hour after the intravenous injection of novasurol. Excretion by the large bowel and salivary glands begins in from 6 to 12 hours. After single doses mercury continues to be excreted for some time. In case No. 15 mercury was found in the stomach washings for 13 and in the urine for 26 days.

Mercury bichloride in contact with tissue causes immediate coagulation and death of cells. A large quantity of the drug may so fix the mucosa that microscopically it appears normal though white and opaque to the naked eye. A small tablet may bring about ulceration in a localized area. Degenerative changes occur early at all sites of elimination, particularly in the kidney, liver, large bowel, mouth and pharynx. The changes brought about in the kidney are very characteristic and have been previously described. Many theories have been advanced as to the method of action, the generally accepted one being that there is a direct

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effect upon the cell. The intensity of the lesions found in the intestines, kidney, liver, etc., is not always the same. Any one organ may be picked out and damaged, according to the amount eliminated by that particular channel.

Clinical Features.

As the drug is swallowed the characteristic metallic taste is perceived, and at the same time or in a very few minutes a burning sensation is experienced in the pharynx, œsophagus and epigastrium. These symptoms are more pronounced if the mercurial has been in solution, but are usually present even when it is in the solid form. If bichloride of mercury has been ingested in any quantity the mucous membrane of the tongue and pharynx becomes coated with a grey film within a very few minutes.

Vomiting is the most common symptom, occurring in 17 of our patients. It begins in from two minutes to one-half hour after ingestion, and becomes frequent and distressing if large amounts of mercury have been taken, the vomitus often being blood-stained. All patients who showed evidence of toxicity had diarrhœa and stomatitis. The former begins within a few hours, the stools being liquid, bulky, extremely fœtid, and later bloody. There is marked tenesmus, and soon the whole abdomen becomes tender and sore, especially along the course of the colon. Usually by the third day, and occasionally within a few hours, salivation, stomatitis, glossitis and gingivitis occur. The tongue and buccal mucous membrane may become enormously swollen, causing embarrassment in speech, respiration and deglutition, and so interfering seriously with treatment. The breath is foul. The mouth symptoms vary greatly in severity, being usually more pronounced in cases of long duration. In case No. 1 there were extensive sloughs in the mouth, pharynx and vagina; in some patients death can be attributed to this factor.

The temperature varied with the severity of the illness, being normal in very mild cases and rarely above 38.8°C. in the severe ones. In case No. 1 the temperature reached 41.1°C. shortly before death, but this was due in part to secondary infection of the sloughing tissues. The blood pressures are a little lower than the readings one would expect in a corresponding group of normal individuals. Blood pressure tends to decrease with increase in toxicity. If absorption has taken place from the vagina severe local reaction may occur. In these patients local symptoms and those referable to the intestine occur first. Oliguria was present in 6 patients and anuria in 2. Patient No. 15 was anuric for four days and then recovered. If anuria develops it usually occurs within 72 hours and may last as long as 8 days with recovery. During the anuric period the patient may become drowsy and slight convulsive seizures may occur but typical uræmia is uncommon. Œdema is rarely present. It was not seen in our patients. A scarlatiniform eruption may occur.

The very sick patients showed a gradual decrease in the number of red blood cells and in the percentage of hæmoglobin. Except in those with little toxicity, a leucocytosis occurred, varying from 9,000 to 32,650. There was a corresponding increase in the polymorphonuclear elements, which reached as high as 91 per cent. When considerable absorption of mercury had taken place there was a rapid rise in the non-protein-nitrogen constituents of the blood. A definite elevation occurred by the third day and within 14 days this had usually reached its maximum or the patient had succumbed. These amounts may reach very high levels and yet recovery occur. The highest figures obtained in our series were in patient No. 21, who died 12 days after a single bichloride vaginal douche. At the time of death the non-protein nitrogen was 293 mg., the urea-nitrogen 240 mg., and uric acid 18.3 mg. per cent. In patient No. 1, who also died, the non-protein nitrogen did not rise above 120 mg. per cent. Patient No. 15 recovered, even though the non-protein nitrogen reached 236 mg., the urea-nitrogen 168 mg., the uric acid 10 mg. and the creatinine 13 mg. per 100 c.cm. blood. When there is this amount of retention in nephritis, recovery does not occur, and this suggests some additional causative factor in mercury poisoning. The blood chlorides are usually low, as in 3 of our patients, and in 4 of the 5 patients in whom determinations were made the carbon dioxide combining power of the blood decreased with increase in the degree of toxicity. The phthalein excretion rapidly falls to zero in the very sick patients and gradually returns to normal with recovery.

Glycosuria is not uncommon, although it was not found in our patients. Hyperglycæmia does not occur. Albumin was present in the urine of 16 patients and the amount usually varies with the severity of the general symptoms. Casts were reported in 9 instances and red blood cells in 2.

Diagnosis.

The diagnosis is usually easy from the history and clinical examination. It is readily confirmed in a few hours by examination of the stomach contents and excreta. Patient No. 1 was suspected of having Vincent's angina until examination of the blood revealed a high non-protein nitrogen, and the urine showed the presence of mercury. In this group the stomach contents were examined in 16 patients and 11 gave positive reactions for mercury. The stools were also examined in 16 with 11 positive results. The urine was tested in 17 patients with 13 positive results. The bile was examined in 5 with 3 positive results. From a study of the records it is felt that negative findings were due to insufficient or unsatisfactory specimens. Certain patients who give the history of having taken poison should be treated intensively until the information is proved false.

Prognosis.

The prognosis depends largely on the amount of mercury that has been absorbed and the susceptibility of the patient. The mortality in this series was 14.3 per cent. (*sic*). Two deaths followed bichloride vaginal douches. A third patient died 14 days after taking 15 grains of mercury bichloride by mouth, treatment having been delayed two days. The fourth death followed 7 days after the ingestion of 22 grains of corrosive sublimate, treatment having been started four hours after the drug was taken. Patients Nos. 4 and 15 were critically ill for several days, but finally recovered. In a group of 135 consecutive patients, taking from 15 grains to 60 grains, Weiss reports a mortality of 6 per cent.; Witthaus from a series of 745 patients gives the mortality as 55.1 per cent. More recent results from Cook County Hospital give a mortality of 15.5 per cent.

If death results from a single dose, it is usually due to renal insufficiency and takes place in from 5 to 14 days. Death as early as 3 hours and as late as 41 days following a single dose has been reported. In animals a massive intravenous dose causes immediate death, while with a smaller lethal dose the length of life is largely proportional to the size of the dose. Occasionally death is due to a severe colitis, vaginitis, or stomatitis. Liver degeneration is also a factor in bringing about death. If the patient recovers it is believed that he does so completely, without appreciable scars to interfere later with his health.

Treatment.

An early start is the important feature in treatment, and efforts should be chiefly directed towards prevention of absorption. In spite of the long list of drugs that have been brought forward as of value in the treatment of mercury poisoning, it has not been established that we have any effective antidote after the metal has reached the circulation. One of the most recent of such substances introduced for this purpose is strontium thioacetate. This in turn has been shown to be without value in experimental work on animals. Various therapeutic procedures have been advocated

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from time to time as being almost specific for mercury poisoning. Forced fluid administration, alkali therapy, exsanguination-transfusion, intravenous glucose, intravenous saline solution, and decapsulation of the kidney have each been brought forward as being highly useful. In dogs none of these measures have of themselves proved capable of even lengthening life. This does not mean that one or more of such procedures cannot be used to advantage in conjunction with other measures, for if the patient's general condition can be supported until the bulk of the mercury is excreted he may stand a chance of recovering, owing to the natural ability of the damaged organs to regenerate.

Without doubt, our most valuable method of treatment is the mechanical removal of the poison, as once a lethal dose has entered the circulation our chances of saving life are small. Because of the rapidity of absorption, treatment carried out within the first few minutes will be much more effective than if delayed several hours. Before the physician arrives nature has usually played an important part, in that repeated vomiting has already removed a considerable portion of the drug. In addition, in the majority of cases friends have given protein in the form of eggs and milk. If this has already been done, the stomach should be immediately washed out with a saturated solution of sodium bicarbonate, at least two quarts being used until it is returned clear. By the time the average patient reaches the hospital a considerable portion of the drug will have passed into the small intestine and even though a strong cathartic is given after the gastric lavage, several hours may elapse before a thorough evacuation of the bowels occurs. Such a delay allows still more mercury to enter the circulation. This added absorption may be avoided if immediately after the gastric lavage a duodenal tube is passed and transduodenal irrigation carried out. This is done by passing slowly down the tube a warm saturated solution of sodium bicarbonate until the patient expresses a desire to defæcate. This usually occurs after one or two quarts have been given. In this way, the whole intestine is washed out, removing at once that portion of the drug which has left the stomach. One ounce of a saturated solution of magnesium sulphate should be left in the duodenum before withdrawing the tube.

The patient is now placed on the bed rest and given a high-carbohydrate maintenance-protein low-salt diet. Six ounces of milk, alternating with two ounces of lactose in six ounces of fruit juice, are given every two hours. Extra carbohydrate is readily supplied in this way, and the protein in the milk is constantly available to form an insoluble mercury proteinate with the metal being excreted into the gastro-intestinal tract. The value of glucose in sparing the liver and kidney in toxic conditions and its usefulness in mercury poisoning is supported experimentally. A careful record is kept of the fluid intake and every effort made to give at least 5,000 c.cm. each 24 hours. A difference of opinion exists as to the advisability of giving large amounts of fluid. The majority of writers stress the importance of forced fluid administration in hastening the elimination of mercury. Haskell has recently questioned its value and even considers that it may be harmful. However, not only does the bulk of evidence appear to be in its favour but also it seems a rational procedure, unless there is a specific contra-indication, such as a damaged heart.

Within a few hours after ingestion the salivary glands, gastric mucosa, and large intestine begin to excrete mercury. If reabsorption is to be prevented repeated lavage of these areas is important. A mouth wash, consisting preferably of a saturated solution of sodium thiosulphate, should be used frequently, and the stomach and colon irrigated twice a day. Anderson goes so far as to advise cæcostomy and continuous irrigation of the large bowel. It would seem that such a procedure should be reserved for those occasional cases where the colitis overshadows the general picture of mercury poisoning. In spite of the frequent washing of the mouth and stomach at least some mercury is constantly entering the small intestine for reabsorption.

In addition, by the second day the mercury excreted by the liver in the bile will be available to return to the circulation. In our later patients, gastric lavage was carried out with a duodenal tube at least once daily. The tube was then allowed to pass into the duodenum and transduodenal irrigation carried out. While the tube was still in place, using an ounce of a saturated solution of magnesium sulphate as a stimulant, biliary drainage was done for several hours until 500 c.cm. to 600 c.cm. of bile were drawn off. It was hoped in this way to prevent some reabsorption.

If the patient has been seen early, such treatment in many cases will have prevented entry to the circulation of mercury in sufficient quantities to cause severe symptoms. However, if oliguria and anuria threaten, hot packs may prove beneficial. With increasing toxicity, the food and fluid intake is apt to become low. It then becomes important to give fluids parenterally and with these enough glucose can be incorporated to maintain the carbohydrate intake. In the toxic patients a fall in the blood chlorides is common and the importance of maintaining them at their normal level has been recently stressed. This can be done by giving the fluid as glucose saline solution. MacNider has contended that the kidney damage is brought about largely by an acid intoxication. Many severe cases develop an acidosis and because of this alkalies have been advocated. There is considerable contradictory evidence as to their value. Some writers consider them distinctly harmful and experimental evidence does not support their usefulness.

Robertson has shown that exsanguination-transfusion is of value in various toxic conditions, especially burns in children. That fairly large amounts of mercury remain in the circulation has been shown by Rosenbloom. The removal of large amounts of blood followed by transfusion has been advocated in mercury poisoning, but experimental work has failed to support this procedure. This measure was repeatedly carried out in patients Nos. 4 and 15 and they seemed to derive distinct benefit from its use. Whether enough mercury is removed to justify large venesections is doubtful; however, certain patients become quite anæmic on account of the toxic action of the metal as well as the loss of blood from the mouth, stomach and bowel, and in such transfusion seems definitely indicated.

We use sodium thiosulphate, both by mouth and intravenously. Its intravenous use has not proved valuable in experimental animals although it has been shown to be harmless. In the test tube this drug reacts with mercury bichloride to form insoluble compounds and on this basis it seems reasonable to use it by mouth. In certain types of arsenic poisoning sodium thiosulphate is considered almost a specific, and certain writers consider it of value in poisoning by mercury. We shall continue to use it until a more specific antidote is discovered.

None of our patients were operated upon for decapsulation of the kidney. Theoretically, this procedure might offer some help in anuria. The results reported are contradictory. Decapsulation should be reserved as an extreme measure. Knowing that patients have recovered after an anuria of eight days' duration without decapsulation, recovery should not be too readily attributed to this operation.

Intensive therapy should be carried out as long as appreciable excretion of mercury occurs. The variety of antidotes recommended and therapeutic procedures advised are indication enough that we have as yet found no specific method of therapy for mercury poisoning. Until such a method is discovered, we shall have performed the maximum service for the patient if we do everything at our command to prevent the drug from entering the circulation, and at the same time administer general treatment such as we would use in any other toxic condition.

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Ruptured Tubal Pregnancy.

By J. B. COLLIP, Ph.D., M.D., D.SC.

(Abstracted from the *Irish Journal of Medical Science*, Sixth Series, No. 64, April, 1931, p. 173.)

It is well to ventilate such a common occurrence as ruptured ectopic gestation at intervals, for it provokes discussion and the different opinions on various aspects of the subject are expressed. Whether ruptured ectopic pregnancy, accompanied by severe symptoms of collapse, is common or not is apparently not agreed upon, but the number of cases in the practice of the writer makes him believe that it is a frequent occurrence.

The diagnosis may be simple or difficult: many patients give a definite clinical history, but some give no history at all, that is, there is no amenorrhœa nor are there any of the expected cardinal symptoms: on the contrary, the symptoms of intestinal obstruction may be present, and there are no signs in the pelvis.

One of the most important points which arises is where to operate. If the case is seen in the country, should she be brought to a town or should the operation be done there? The answer is emphatically "on the spot". The writer would prefer to operate on an acute ruptured ectopic pregnancy on a kitchen table by the light of an electric torch, than to move the patient to the most palatial hospital. If, however, she is near a hospital, after a preliminary submammary saline infusion and morphine gr. ¼, she should be gently and quietly moved, arrangements having been previously made for the preparation of the theatre, etc.

Should the operation be deferred? The answer is emphatically in the negative. Once the condition is diagnosed, the patient is given submammary saline and morphine: the former is continued if necessary during the operation. The abdomen is opened as soon as the theatre is prepared, the rupture found, and the tube removed. All clots which present themselves are removed, but no time is lost in seeking for clots; the abdomen is filled with saline and closed. The patient is brought back to bed, and warmth, fluids, and restoratives are given. Patients treated in this way always recover: if they are allowed to continue bleeding, or if they are bumped up to a town from a distant place in the country, they will die.

Transfusion of blood has become an established treatment. As these cases are usually emergencies, there may not be a suitable donor available, therefore a treatment must be outlined suitable to all occasions. Submammary saline is the best treatment and is entirely effective. Unless everything is ready for blood transfusion one should not delay.

The choice of anæsthetic is of little moment: while gas and oxygen is very pleasant, it may not be available, and ether is entirely suitable for this class of cases.

In the experience of the writer, no ill effects follow even the severe case of ruptured ectopic, *i.e.*, one which is accompanied by marked collapse or shock.

The conclusions arrived at are:—

(1) Ruptured ectopic often gives typical symptoms and signs.

(2) When possible the operation should be performed in good surroundings, but if the patient is far away, the operation should be proceeded with on the spot.

(3) Transfusion of blood is unnecessary. Submammary saline is effective.

(4) No time should be lost searching for clots during the operation. The obvious ones should be removed and the abdomen filled with saline.

(5) To defer operation is unwise. During the half hour necessary for preparations, the patient should be given fluids and morphine.

The Physiology of the Parathyroid Glands.

By J. B. COLLIP, Ph.D., M.D., D.SC.

(Abstracted from the *Canadian Medical Association Journal*, Vol. XXIV, No. 5, May, 1931, p. 646.)

Clinical Conditions in which Calcium Metabolism or Parathyroid Function is disturbed.

Tetany.—Post-operative tetany represents the nearest clinical parallel to parathyroidectomy in the dog. As a rule it is due in part to removal of a portion of the parathyroid apparatus and trauma of the remainder. Trauma of the parathyroid glands leads to a marked suppression of function which, however, is not permanent. Fatal tetany may occur in a rabbit following traumatization of the glands. Treatment should consist of large doses of calcium salts by mouth, or of subcutaneous injections of parathyroid hormone or intravenous calcium chloride if the condition of the patient is acute. Vitamin D therapy should also be of value.

Complete parathyroidectomy in the human subject is a matter of grave concern, since it may require long-continued treatment, and if such a case develops an immunity to the hormone adequate control of the calcium metabolism may become impossible and death result. Since the introduction of irradiated ergosterol it is possible that such a fatality may be avoided in the future.

In the tetany of spontaneous hypo-parathyroidism there is as a rule a lowered blood-serum calcium and an increased inorganic phosphate. It is of interest to note that lesions of the ectodermal tissues, such as cataract, brittleness and ridging of the nails, and enamel defects of the teeth, have been described in association with hypo-parathyroidism in the human subject. Cataract has been observed in rats six months after parathyroidectomy. It is also a common occurrence in parathyroidectomized dogs.

Infantile tetany does not differ materially from tetany of spontaneous hypoparathyroidism in the adult in so far as the blood chemistry picture is concerned. Since infantile tetany is so frequently associated with infantile rickets it is evident that its ætiology is not entirely a matter of hypoparathyroid-function. Hess, in discussing this question, says, "the simple theory of a deficiency of calcium due to a lack of function of the parathyroid glands is not absolutely satisfactory. Some other factor seems to be involved. We do not find the parallelism we should expect between tetany in infants and in animals, and the decrease of calcium in the blood. In other words, although calcium and the function of the parathyroid glands play the dominant rôle, there seem to be other factors which qualify their effect in relation to the development of tetany".

Hyperventilation, or "alkalosis tetany", is met with clinically in the form of spontaneous tetany due to over-ventilation. It may also occur in the presence of alkalosis due to excessive alkalinization, or as a result of loss of HCl through vomiting. There is no change in the blood-serum calcium in such cases, but a decrease in the degree of ionization due to the increased pH of the blood.

Osteomalacia.—Although the bone changes observed in osteomalacia are not of the same type as those seen in typical rickets the general view at present is that osteomalacia is the counterpart in adult life of low-calcium rickets in children. A low blood-serum calcium is uniformly found in osteomalacia with or without an increased inorganic phosphorus. Tetany is also a common occurrence in this disease. The most constant metabolic phenomenon is a net loss in calcium.

Hunger osteopathy.—Various forms of hunger osteopathy occurred in Austria, Germany and Poland during the war. Detailed blood chemistry studies in such cases are lacking, but the causative factors were undoubtedly lack of vitamins, chiefly D, and of calcium and phosphorus in the diet. Rickets, late rickets, osteomalacia and Paget's disease all increased greatly both in incidence and severity during this period.

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Marked hypertrophy of the parathyroid glands was observed by Schmorl in a man of 73 who had suffered from hunger osteomalacia.

Renal rickets and coeliac rickets.—In both of these conditions a lowered blood-serum calcium has been found. The blood inorganic phosphorus in renal rickets is usually greatly increased, values as high as 14 mg. having been reported. Inorganic phosphorus in the blood serum of cases of coeliac rickets has not been very thoroughly investigated. Vollmer and Serebrijski have reported a case in which the blood-serum phosphorus was 2.9 mgm. and the calcium 5.4. It is stated that the osteoporotic bones of coeliac rickets tend to fracture, whereas in renal rickets the bones are more elastic and tend to bend.

Chorea.—Suggestive evidence that a slightly lowered calcium content of both blood serum and cerebro-spinal fluid exists in chorea has recently been obtained by Warner. Coincident with recovery this investigator observed an increase of 0.59 mgm. in the cerebro-spinal-fluid calcium.

Generalized osteitis fibrosa of von Recklinghausen.—Hunter has recently reviewed the literature relating to this type of case, and has been able to add some of his own cases in which most detailed studies of calcium metabolism and bone pathology have been carried out. Fourteen cases have been published to date and there is every evidence that in this disease the underlying cause is a condition of hyperparathyroidism, associated as a rule with a parathyroid tumour. Among some of the noteworthy cases of this disease recently reported are those of Mandl, Hannon, Barr and associates, and Hunter. The main findings as regards blood chemistry and metabolism in this disease are hypercalcæmia and an excessive excretion of calcium salts, especially by the kidneys. There is usually a lowered inorganic serum phosphate and the plasma phosphatase is greatly increased. According to Hunter, radiograms show a greatly diminished density of all bones examined as compared with controls of normal subjects of like age, size and sex. Cyst-like areas, some of them trabeculated, may be present. Extensive areas of decalcification may occur and spontaneous fracture is a frequent occurrence. A local condition of giant-cell tumour has been mistaken for sarcoma. Microscopic examination of the bone reveals no evidence of true osteomalacia. There is a great decrease in the calcium salts of the bone, which have been removed by a process of lacunar resorption by osteoclasts. The resorption is widespread, but is accompanied by focal formation of new bone. Bilateral renal calculi were found in Barr's case.

In the 14 cases which have been reported of the blood serum, calcium varied from 13.1 to 23.6 mgm. per cent., and the plasma phosphorus between 1.0 and 2.7 mgm. The calcium output in the urine varied from a slight increase to an eightfold increase. These observations are of the greatest interest for they afford for the first time a means of contrasting spontaneous hyperparathyroidism in man with parathyroid hormone overdosage in the dog. The essential difference appears to be in regard to the inorganic-phosphorus response. This factor remains normal or sub-normal in man in hyperparathyroidism, whereas it rises to high levels in the dog in parathyroid-hormone overdosage. It is for this reason that death occurs in the dog, whereas the human subject can apparently withstand for a long period a high level of blood calcium produced by hyperfunction of the parathyroid tissue. The changes which are brought about in the skeletal structures in this disease are, however, parallel with the results obtained in normal animals treated with parathyroid extract over a prolonged period.

The diagnosis of hyperparathyroidism can now be made on the basis of radiograms and blood chemistry. Treatment has been surgical, and either a parathyroid tumour has been found and removed or else normal glands have been removed. After the removal of a parathyroid tumour the blood calcium has been observed to fall rather rapidly, and sub-normal values have resulted in some cases to such an extent as to precipitate attacks of tetany. This post-operative condition has been controlled where it has appeared by calcium and parathyroid therapy.

The Treatment of Placenta Prævia.

By M. PIERCE RUCKER, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. XCVI, No. 19, 9th May, 1931, p. 1567.)

Conclusions.

THERE are certain fundamental principles in the treatment of placenta prævia that should be observed whether the patient is treated in general practice or in a well-equipped obstetric hospital.

1. The significance of a hæmorrhage in the last half of pregnancy should not be minimized. Too often the patient is encouraged with the hope that it will not recur.
2. No pelvic examination should be made until everything is in readiness to manage the patient should it be found that the placenta is presenting.
3. A vaginal pack done as a makeshift, *i.e.*, until help can be secured or the patient can be taken to a hospital, probably does more harm than good. A better plan is to give the patient a dose of morphine and disturb her as little as possible.
4. The importance of blood transfusions is self-evident.
5. One cannot show the cervix too much respect. Dilatation should not be hurried and should be complete before any operative delivery, except a Braxton Hicks' version, is attempted. If Vorhees' bags are used, a number 5 is preferable. When the bag is about to come through the cervix the patient should be on the delivery table and everything should be in readiness for an immediate delivery should that be necessary.
6. The extra-ovular placement of the bag is preferable.
7. Postpartum hæmorrhage has not been a problem in my cases, but its danger should be constantly borne in mind.
8. In the interest of the child, Cæsarean section has a place in complete and partial placenta prævia.

Splenic Functions and Diseases.

(Abstracted from the *Lancet*, Vol. CCXX, 16th May, 1931, p. 1091.)

As a classification for ordinary purposes of the diseases of the spleen, Dr. McNee in his Lettsomian Lectures at the Medical Society of London suggests the adoption of one partly based on the histological changes in the chief constituent elements of the organ, namely: (1) the myeloid and lymphatic; (2) the endothelial (the reticulo-endothelial system); (3) the vascular system with its special peculiarities; and (4) the reticulum and supporting tissue, the trabeculæ, and the capsule. In addition to the first three of the above categories he now proposes groups headed abnormalities, tumours, infections, and combined diseases of the spleen, liver, and hæmopoietic system, making seven in all. His systematic and detailed account of the diseases met with in this country is largely derived from personal observation of clinical cases and pathological examination of many more than the 100 spleens on which he based his former classification in 1929; there is admittedly little about tropical splenomegalies or morbid changes in the spleen occurring incidentally in generalised conditions such as syphilis, tuberculosis, Hodgkin's lymphogranuloma, and leukæmia. Attention may be specially directed to the three types of disease included under the heading of those affecting the reticulo-endothelial system—namely, chronic hæmolytic jaundice, disturbances in lipoid metabolism leading to Gaucher's and Niemann's diseases, and to hypercholesterolæmic splenomegaly in diabetes mellitus, and

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thirdly, chronic splenomegalies of unknown origin showing well-marked proliferation of the reticulo-endothelial cells with giant cells, sometimes in such large numbers as to simulate a myeloma, but not megakaryocytes from the bone-marrow. The nature of these cases, in which the spleen may be very large, is obscure, and Dr. McNee can only suggest that they represent the response of the reticulo-endothelial cells to very chronic inflammation. The group of diseases affecting the vascular system of the organ forms the largest of British splenomegalies, and includes many cases labelled chronic splenic anæmia and those due to thrombosis of the splenic vein. Splenomegaly, associated with peri-ellipsoid hæmorrhages and nodular siderosis, is not only extremely frequent, but has excited a considerable literature not devoid of a controversial character. Scattered over the cut surface of the organ are irregularly shaped, yellowish-brown nodules, the Gandy-Gamma or Gandy nodules, which contain iron and calcium; they were regarded by A. G. Gibson in 1913-14, and after the war by Nanta, Pinoy, Gruny, Emile-Weil, and other French observers, as due to mycotic invasion. But McNee strongly opposes this view and regards them as the result of past hæmorrhages.

Though these lectures are full of personal observation, and show a critical knowledge of the vast literature of the subject, they do not profess to be a final pronouncement, and those keenly interested in this instalment of the lecturer's results and conclusions will anticipate further instruction from him in the future.

Lung Cancer and Lung Tuberculosis.

By H. T. PESSAR, M.D.

(Abstracted from the *New York State Journal of Medicine*, Vol. XXXI, No. 7, 1st April, 1931, p. 413.)

COMMENTS.

1. It is not a matter of common knowledge that afternoon rise of temperature, so much stressed in pulmonary tuberculosis, is present in a very large percentage of lung malignancy. The rise in temperature is caused by:

(*a*) Toxic absorption from degenerated tumour cells.

(*b*) Infection of the tumour mass.

(*c*) Absorption from dilated bronchi distal to the obstructing tumour.

2. Blood spitting, while most common in phthisis, occurs in many other chronic lung diseases, and is often seen in bronchiectasis, and not infrequently in chronic bronchitis. A possible malignant ætiology should be excluded *when it occurs for the first time* in an individual past middle age.

3. Severe, prolonged pain in the chest is not common in lung tuberculosis uncomplicated by pleurisy, but it is an early persistent symptom in neoplasm of the lung. Its occurrence in an individual past 45 years of age should put the alert physician on his guard.

4. An impressive feature of the disease is the absence of symptoms in the beginning, markedly contrasted by the occurrence of great prostration later, out of proportion to the amount of involvement.

5. The *x*-ray findings in bronchogenic hilar neoplasm are definite and characteristic—the dense mass at the hilum with infiltration towards the periphery. The infiltration may be actual or due to atelectasis distal to a stenosed bronchus.

6. Since 90 per cent. of all primary neoplasms of the lungs are bronchogenic, a change in the intensity of breath sounds is an early and important sign of pulmonary carcinoma. Diminished intensity of breathing *in one lung* in an individual of cancer age calls for a bronchoscopic examination to rule out malignancy.

7. Definite diagnosis is imperative, because prognosis at present is grave; and the only hope for prolongation of life and perhaps cure lies in early diagnosis followed promptly by intensive deep *x*-ray therapy. This is generally accepted as the best and most conservative form of treatment where applicable.

Blood Cultures and their Function.

(Abstracted from an Editorial in the *Journal of the American Medical Association*, Vol. XCVI, No. 14, 4th April, 1931, p. 1147.)

IN bacterial endocarditis, sinus thrombosis, the septicæmias and other similar conditions, methods of blood culture easy to apply are satisfactory to a gratifying degree. In certain of the acute infections such as typhoid, pneumonia, and epidemic meningitis the causative organism can be recovered from the blood stream early in the infection in a high percentage of cases. In the latter group, however, it is rarely necessary to obtain a culture from the blood to establish diagnosis. When obtained, it is more rarely of benefit in the treatment of disease.

The importance of blood cultures is being constantly re-emphasized by the persistent attempts to cultivate organisms from the blood in the rheumatic and arthritic conditions. Some observers have apparently succeeded, but others, no doubt equally careful in their technic, have failed to corroborate them. Confidence that the causative agent of rheumatic fever or some of the forms of arthritis can be discovered in this way is, however, perhaps overestimated. In many of the acute infectious diseases the responsible microbe can be isolated from the blood only with difficulty and irregularity. It is therefore by no means certain that bacteræmia occurs sufficiently often in the more chronic rheumatic and arthritic conditions to allow of any reliability in obtaining the bacterium, if such exists, from the blood stream. Nye and Waxelbaum, who have recently registered the failure of their attempts to isolate organisms from the blood in these conditions, state the same principle: "To consider that these same streptococci remain in or about the affected joint to such an extent that they are found in the blood stream in cases of chronic infectious arthritis of years' duration demands a rather unique conception." Moreover, it is by no means certain that the disease entity known by that name is a single disease in the sense of having a single microbic ætiology.

The factors that contribute to finding organisms in blood cultures are numerous. Among these may be mentioned the presence of organisms in the blood unrelated to the disease process in question; variation in the time and of the circumstances at which organisms are present in the blood; the filtration of organisms present in part of the blood stream so that they are not found in another, and contamination during various phases of the technic. Though there are many others, the latter probably deserves premier consideration because of the fact that it is the most frequent ground for criticism applied to any positive bacteriologic results. Thus Nye and Waxelbaum state that certain evidences "point to the probability, even certainty, of streptococci occurring in some cultures as contaminants, and the work of Olitsky and Long and of Long, Olitsky and Stewart has clearly demonstrated that the air contamination of ground material with non-hæmolytic green-producing streptococci can occur just as easily as with diphtheroids and staphylococci. It is obvious, in such cases, that the types of organisms recovered are dependent on the flora of the air of the laboratory or of the throat of the laboratory worker, and this point may well explain the differences in the cultural findings under consideration." On the other hand, those who obtain organisms from the blood generally consider the failure of others to be due to inadequate technic. Thus, Kracke and Teasley consider the chief factor in the unsatisfactory results of blood cultures to be due to failure to dilute sufficiently, or fix the complement, and thus reduce the antibacterial action of the blood itself. Whether this or some other technical inferiority is the correct explanation is not yet known.

Over the finding of organisms in the blood, over their nature and significance, general disagreement

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reigns as far as the diseases of uncertain ætiology are concerned. That a more exact understanding of the nature of some diseases is to be obtained by this method is to be hoped. It seems scarcely likely, however, that this is the most promising method of attack for several of the conditions which have been studied intensively in this way over a number of years and in many different laboratories.

The Interpretation of Pain in Infancy.

By WILFRID SHELDON, M.D., M.R.C.P.

(Abstracted from the *British Medical Journal*, 28th March, 1931, p. 530.)

Chief Evidences of Pain.

The commonest effect of pain on a baby is to make him cry, and much help is to be gained from a study of the characters of this expression. Pain is by no means the only cause of a baby's crying; hunger, cold, a soiled napkin, or simply a state of boredom are also contributory factors. It is not until the child exercises his will that crying due to temper makes its appearance; this is a cause which is exceptional in those under 6 months of age.

The features which should always be noted are whether the cry is intermittent or continuous, whether it is a piteous wailing or a short, sharp scream, and whether it occurs at any particular time of the day or night. Does it bear any relation to the times of feeding, being relieved or aggravated by food? Does it cease after the belching of a good deal of wind? The history may show that the pain only accompanies certain physiological performances such as sucking, micturition, or defæcation. Under the stress of severe pain the infant may not cry because he is holding his breath, as frequently happens in severe colic.

The baby's posture during the bouts of pain should be carefully noted. It may be that the hips are flexed to bring the thighs up on to the abdomen, while the arms may be bent, with the elbows firmly pressed against the sides. In other cases, the infant may become rigidly extended, with arched back, so that he supports himself by his head and heels. Finally, on clinical examination there may be found areas of distinct tenderness associated with pain, indicating its localization.

Gastro-Intestinal Pain.

The commonest cause of gastro-intestinal pain is some error connected with the diet, and the fault can generally be traced to one of three things—namely, the amount of food may be too great for the infant's digestive capacity, the diet may be badly constituted, or there may be some flaw in the method of giving the food. Simple under-feeding does not of itself give rise to pain, excepting that accounted for by the pangs of hunger. The pain of indigestion has a direct relation to meals, and if it arises in the stomach it will generally be manifest within a few minutes of a feed. If the cause lies further down the intestinal tract, the evidence of pain is likely to appear from half an hour to an hour after food has been given. If the fault continues unchecked, chronic indigestion will follow and pain will become continuous, lasting from one meal-time until the next. Simple overfilling of the stomach with food is not a common cause of pain in infancy, partly because the infant's stomach is a readily distensible organ, and partly because any attempt to overdistend it is countered by vomiting, a process which is much less disturbing in infancy than in later life. The old custom of winding about a yard of flannel round the baby's abdomen, and so preventing the natural post-prandial epigastric fullness, was often a cause of discomfort and pain; fortunately, this practice is becoming less common.

Errors of diet lead to excessive peristalsis, and culminate in painful colicky contractions. The pain in these cases is generally intermittent. At intervals of a few minutes the baby begins to cry, draws his knees up on the abdomen and presses his elbows into the sides; this attitude is maintained for two or three minutes while the baby cries vigorously, then the attack subsides. During the attack, relief may be given by keeping up a steady pressure with the warmed hand on the abdomen, or, more easily, by turning the baby over and allowing him to lie on his face, with the abdomen supported across the palm of the hand. The position of the infant in these attacks is exactly comparable to that of the adult in similar circumstances. We may briefly consider, below, the various dietetic errors which may culminate in colic. Most commonly there is an excess of gas in the stomach or intestine. In the stomach this gas will be excess air swallowed with the food, and probably it is a result of too big or too small a hole in the teat of the bottle, or of the baby being allowed to suck at an empty breast. When there is excessive gas in the intestine, some of it may have been passed on from the stomach, but the passage of large amounts of flatus per rectum is more frequently due to too much sugar in the diet, leading to intestinal fermentation, with the liberation of carbonic acid gas. Colicky pain may also result from irritation of the intestine by large, tough casein curds, or, less frequently, by fat curds. In the management of these cases, the fault in the diet must first of all be corrected. Small doses of chloral (½ to 1 grain), given just before the feed, are useful, helping the child to drop off to sleep after the meal, and ensuring a period of peaceful digestion. Vigorous jogging of the baby is quite unnecessary; the simple procedure of holding the infant upright against the shoulder and patting the back is all that is required to release a large bubble of air imprisoned in the stomach.

Stomatitis.

We are sometimes told that a baby sucks from the breast or bottle for a minute or two, and then cries and refuses to continue sucking. It may be that the breast is empty or that the hole in the teat is so small that the infant cannot draw milk, and turns away disgusted. When, however, a child has previously been making satisfactory progress, these symptoms are often due to painful conditions inside the mouth, which should be carefully examined in a good light. There may be a simple catarrhal stomatitis, or a condition of thrush affecting the tongue and the inside of the cheeks. Numerous small shallow ulcers may be found in the mouth. Fortunately the gangrenous form of stomatitis is rare, for it is accompanied by grave toxæmia and a high mortality. In the management of these cases, the milk, well cooled, should be given from a spoon. The feeding utensils must be properly sterilized, and the mouth cleansed before and after each feed by gently swabbing with borax and glycerin, or with a weak solution of hydrogen peroxide.

Constipation.

A mother sometimes complains that her infant screams when he is having a motion. The pain is generally the result of constipation. The infant strains and goes red in the face; eventually, if the effort is successful, a hard scybalum is passed, often leaving the baby pallid and exhausted. A diet rich in fat, such as a full-cream dried milk food, combined, perhaps, with insufficient sugar, often leads to this state, and a proper adjustment of the food may be all that is required. A small teaspoonful of magnesia, or the same amount of paraffin, given once a day, will be effective in other cases, and will not upset the digestion. Occasionally, and oftener in females, there is associated with the constipation, spasm of the anal sphincter, which by its rigid contraction maintains and intensifies the state of constipation. Anal spasm can only be detected by performing a rectal examination. In the normal infant gentle but steady pressure with the well-greased forefinger will enable it to pass without difficulty into the rectum, but in the presence of anal

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spasm the anal orifice is much smaller, and the sphincter feels like a tightly constricting band round the finger. Digital examination of the rectum stretches the sphincter, and may suffice to cure the condition.

Anal Fissure.

Another cause of painful defæcation is the presence of a fissure at the anus. This is not uncommon in babies, and is generally due to tearing of the mucosa during the passage of hard fæcal masses, which may be streaked with a little bright blood. The fissure is usually small, and can only be seen when the anal folds are held gently apart. It may lead to spasm of the anus, which increases the constipation, and in this way a vicious circle is set up. Defæcation is resisted by the baby, who screams, arches his back, and compresses his buttocks together. Treatment consists in softening the stool with paraffin, while the fissure may be smeared with an ointment of silver nitrate (1 per cent.). Stretching the anal sphincter with the finger may also lead to a cure.

Intestinal Obstruction.

In a baby previously healthy, the sudden onset of screaming and intestinal colic, with attacks recurring every few minutes, is suggestive of an acute intussusception; the passage of a little blood in the stool, and the typical sausage-shaped tumour in the abdomen, would confirm our suspicions. The rarer causes of obstruction, such as volvulus or strangulation by peritoneal bands and the very rare cases of appendicitis in infancy, are marked by sudden pain, vomiting, and constipation, followed by abdominal distension, and collapse of the child. These symptoms are also encountered in strangulated hernia, but in addition the tender swelling in one groin indicates the true nature of the case.

EARACHE.

Earache is one of the most frequently overlooked causes of pain in infancy. Owing to the short length of the Eustachian tube in the infant, mild catarrhal infections of the nasopharynx, producing little disturbance of health, and generally passing unsuspected, are within easy reach of the middle ear. Screaming and irritability, with fever and often a mild diarrhœa in a young child, should lead to a careful examination of the ears. As in gastro-intestinal colic, the screaming of earache may occur in bouts, but can be distinguished by the posture of the baby. During the exacerbations of earache the infant throws himself into an attitude of rigid extension, arching his back and retracting his head. This attitude will sometimes be maintained for several hours or even for days, and may give rise to suspicions of meningitis. Not infrequently the pain of earache is worse at night, leading to considerable disturbance of sleep. Further indication of the seat of the trouble may be given if the baby constantly pulls and worries at his ears, and rolls and bangs his head on the pillow. On account of the minuteness of the parts, examination of the tympanic membrane in a small baby is not easy. Using a good light and a small-bored speculum, we may note that the normal grey, shiny appearance of the drum is replaced by one which is dull grey or faintly pink; dilated vessels may be seen coursing along the handle of the malleus. The infection is generally bilateral. In severe cases, with head retraction, high fever, and perhaps convulsions, with the drum bulging and under pressure, rapid relief can be brought about by paracentesis. Although pus may not appear for a day or two, the relief of tension will be followed by a sharp fall in temperature and cessation of pain. It is much better to do a paracentesis, which will heal in a few days, than to wait for the drum to burst, for discharge of pus may then persist for months. One or two drops of a solution of 2½ per cent. carbolic acid in 50 per cent. glycerin run into the ear will also diminish the pain. Warm fomentations are particularly useful at night when the baby cannot sleep. They should be large enough to cover the ears amply, and are most easily kept in position by using a tight bonnet instead of a bandage. Small doses of chloral also help to reduce the pain.

TEETHING.

Teething is too often made the excuse for many of the upsets and pains of infancy, but nevertheless I have no doubt that this physiological process does, in some babies, occasion much discomfort and pain. Great irritability and screaming, refusal of food, fever, and even photophobia may all subside with the eruption of a canine or molar tooth.

INTRACRANIAL DISEASE.

This may be the cause of considerable pain in early life. Attacks of sharp screaming may occur in the first stages of post-basic meningitis, sudden piercing screams are not uncommon in the irritable stage which ushers in tuberculous meningitis, and movement of a child whose head is rapidly enlarging from hydrocephalus may cause loud crying.

URINARY PAIN.

Pain arising from the urinary tract is not uncommon in infancy. We may sometimes be misled by a mother's statement that her baby screams every time he passes water, for it may be that he passes water every time he screams—a very different matter. In infancy the bladder is more an abdominal than a pelvic organ, and it is quite likely that the rigid contraction of the abdominal wall when a baby is screaming will tend to compress the bladder and lead to urination, just as an infant will often micturate when the hypogastrium is being palpated. In male infants a common cause of screaming during micturition is the presence of a small ulcer at the urinary meatus. It is commoner in the circumcised, and is partly the outcome of the glans chafing against a rough napkin. The ulcer is often minute, and close examination is required in order that it may be discovered. The exudate from the ulcer dries into a scab over the meatus, and the bursting open of this seal makes micturition painful, and a few drops of blood may precede the passage of urine. Treatment consists in covering the glans with a piece of gauze spread with vaseline, and in paying careful attention to changing the napkins as often as necessary to keep the parts dry. It is also useful to rinse the napkins in a strong boric solution before they are dried. Painful micturition may sometimes be due to a highly acid urine, particularly if the urine comes in contact with excoriated buttocks. This may happen from overfeeding with carbohydrate or fat, and may be relieved by modifying the diet, and by giving small doses of potassium citrate. The passage of large numbers of crystals in the urine may also lead to considerable dysuria. The commonest offenders are uric acid crystals, which are excreted abundantly during the first few weeks of life, and may give rise to renal colic, with attacks of screaming and vomiting. More rarely the passage of oxalate crystals accounts for the symptoms. Relief is given by increasing the intake of fluid and by giving alkalis. The passage of calculi rarely occurs until later on in childhood.

Pyelitis.

Acute infection of the urinary apparatus, and pyelitis in particular, is a frequent cause of pain in infancy, and like otitis media it is often overlooked. This is due partly to the difficulty there may be in collecting a specimen of urine from a baby, and partly to the fact that pyelitis, being commoner in girls, tends to make us less watchful for the condition in male babies. There may be nothing characteristic about the pain of pyelitis beyond the sustained irritability of the infant, and therefore it should be a rule that, in any infant who has a sudden illness with fever, irritability, and perhaps rigors, for which no cause can be found, a sample of urine should be obtained and examined for pus. Sometimes the course of pyelitis may be punctuated by attacks lasting for a few minutes, in which

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the infant screams, stiffens, and appears anguished, then turns pallid and becomes collapsed. These bouts of pain are probably due to the passage of clots of pus down the ureters. Apart from the urine, examination of the baby suffering from pyelitis is generally negative, but palpation may show that the infant is tender in one or both loins, wincing when these areas are touched. The urine which is examined for pus need not be sterile. Gentle pressure over the hypogastrium may be sufficient to start micturition. Another method is to lay the infant on Mackintosh sheeting spread over pillows. The centre of the sheet is then pushed down between the pillows so that when the baby passes urine this will collect in the lowest portion of the Mackintosh. In the male baby free from balanitis or meatal ulceration there should be no pus cells in the uncentrifugalized urine; in girls more than two pus cells in the 1/6 microscopic field should be regarded as abnormal.

Thoracic Pain.

Thoracic pain in the infant is indefinite, and difficult to assess. In lobar and broncho-pneumonia the rapidity and shallowness of the respirations will reflect to some extent the pain resulting from involvement of the pleura, as will the feebleness of the cry owing to the pain of drawing a deep breath. Displacement of the neighbouring structures associated with large accumulations of pus in the pleura may also be painful.

Pain in the Limbs.

Pain in the limbs is shown in two ways: first, the painful limb is moved less than the other limbs, and may be motionless, and, secondly, any attempts to move the limb provoke crying. When an infant has pain in the limbs, trauma must first be excluded. There may be a history of injury, and examination may show bruising of the soft parts; but the more severe lesions, such as fracture or separation of an epiphysis, may only be detected after a most careful clinical scrutiny aided by *x*-ray examination. Trauma, however, is not a common cause of pain in infancy.

Apart from trauma, pain in one or more limbs in an infant under 6 months of age should make us think of syphilitic epiphysitis. In this condition the arms are most commonly affected, and the process may be confined to one limb, which is so immobile that the term "syphilitic pseudo-paralysis" has been given to it. There may be additional evidence of syphilis in the baby, such as condylomata about the anus or mouth, or a history of snuffles or of rashes affecting particularly the palms of the hands and soles of the feet. *X*-ray examination will show inflammatory swelling of the shaft and epiphysis of the affected bone. Under treatment with mercury the pseudo-paralysis will pass off in ten days or so.

Infantile scurvy is the dominating cause of limb pains in the period from the sixth to the eighteenth month of life. Owing to the subperiosteal effusions of blood the pain and tenderness of the limbs is intense, often making the baby cry from anticipated pain before it is actually touched. The observant mother will notice the baby's sensitiveness at an early stage, especially when she bathes her child, a history which is most suggestive of scurvy. The legs are more commonly affected than the arms, and the baby adopts a characteristic attitude, the hips being abducted and externally rotated and the knees bent. There may be visible swelling, most frequently just above or below the knee; in other cases the swelling can only be detected by gentle palpation. Palpation, however, causes such exquisite pain that one first looks for other signs of scurvy, such as purplish swelling of the gums around the erupted teeth, scorbutic beading of the ribs, orbital hæmorrhages, and the presence of red blood cells in the urine. Once the diagnosis is made, relief of the acute symptoms can be brought about in two or three days by giving the antiscorbutic vitamin in the diet. Fresh unboiled cows' milk, fresh fruit juice, and potato made into a cream with milk are all effective, and may be combined in order to expedite the cure. Meanwhile the baby should be moved as little as possible in order to limit the pain, and should only be lifted when his napkins require to be changed.

Two conditions remain which may give severe pain in the limbs. These are acute osteomyelitis and acute poliomyelitis. The onset of osteomyelitis is sudden, and is accompanied by pain and tenderness in the affected limb, the temperature rises to 103° or 104°, and the child rapidly becomes pallid and profoundly toxic. The morbid appearance of the child gives the first clue in distinguishing this condition from scurvy. Later the tissues over the affected bone become swollen and œdematous, and the skin hot and red. As soon as the diagnosis is made the bone abscess should be opened and drained. With this condition we may group the cases of acute suppurative arthritis, often involving several joints, which may arise during infancy, and may lead to swelling of the joints with much pain and loss of movement.

Acute poliomyelitis may occur quite early in the first year of life, and the affected limb or limbs may be acutely tender for the first few days. There is, however, no swelling of the limb, and after a few days wasting becomes apparent. Furthermore, the loss of movement is more profound than in scurvy or epiphysitis, for in these conditions slight movements of the joints can be provoked by stimulation, but in the early stages of poliomyelitis the whole of the affected limb remains motionless.

Results of the Liver Treatment of Pernicious Anæmia.

By JOSEPH E. CONNERY, M.D.

(Abstracted from the *New York State Journal of Medicine*, Vol. XXXI, No. 6, 15th March, 1931, p. 334.)

Conclusions.

A RETURN of normal quantitative hæmatological values may be expected in all but the exceptional case following the use of liver or a potent liver fraction.

Persistent absence of free hydrochloric acid continues to be the rule.

Subjective and objective findings directly dependent on the anæmia are relieved as the blood findings approach normal.

In all but the most advanced degrees of neurological involvement some improvement may be expected and even in this group the outcome may not be so hopeless as first observations would seem to indicate.

In patients previously doing well, who show a fall in the level of the red cells and hæmoglobin, laxity in taking the diet should first be suspected. If this factor can be eliminated the presence of an intercurrent infection is the next most probable explanation.

Clinical Observations on Disease as Modified by a Tropical Climate.

By J. KIRK, M.D.

(Abstracted from *The Practitioner*, Vol. CXXVI, April, 1931, p. 455.)

TROPICAL disease simply means disease modified by the environment of tropical life. These conditions may be specific to the tropics or accidental. Specific conditions may be summarized as:—(1) Weather phenomena, as sunlight, temperature, rainfall, moisture in the atmosphere, barometric pressure, prevailing winds, altitude, etc. (2) The presence of certain forms of vegetable and animal life whose growth and development are favoured by the foregoing physical phenomena. Accidental conditions which may be controlled by administrative or educative measures as:—(1) Sanitary defects, over-crowding, bad housing and living conditions, defective drainage and sewage disposal, and many other obvious hygienic sins of omission and commission. (2) The lack of an efficient standard of social customs

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in regard to common-sense morality, cleanliness, nutrition, etc. (3) A low level in the physical and intellectual development of the native inhabitants.

In the first place, it is evident that the most important modifying conditions in disease as it is met with in the tropics are the effects of a high temperature combined with an excessive percentage of moisture in the atmosphere. These factors naturally influence vitally the two main governing controls of the animal economy, which are, first, the chemical heat-regulation mechanism, and secondly the mechanism which deals with the influence of the external temperature. According to the proper balance of these two factors we have physical well-being or its opposite.

What, then, are the main effects of a tropical temperature with an accompanying high atmospheric humidity on the bodily functions? The following are my own personal conclusions based on twenty years' experience of tropical conditions.

The digestive function.—In the early years of tropical residence and in many cases over a prolonged period, generally speaking, there is an increased power of digestion and an excellent appetite. Therefore larger amounts of food and often of indigestible food are taken with unusual ease and lack of bad effects, and the individual who has been a chronic dyspeptic at home loses his disability in a very large measure. The cause of this is probably a physiological hyperæmia of the abdominal organs with a resulting increase in glandular secretions and digestive hormones.

The respiratory function.—The air capacity of the lung is said to be increased, probably as the result of relaxation of the muscular tissue of the bronchioles. The amount of blood circulating through the organ is lessened following the absence of the chilling effect of cold air on the cutaneous circulation and consequently the excretionary function of the lung is considerably diminished.

The circulatory function.—In my experience the pulse-rate is at least ten beats above the normal of the temperate climates; an average count for a healthy European adult at rest in a recumbent position is 75 to 80. The blood pressure of the European gives a normal, much the same as at home, but I have seen very low pressures in women, and frequently in men who are total abstainers. On the other hand, the blood pressure of the healthy native is on the average about ten millimetres lower than the European normal, and his pulse-rate is also at a definitely lower rate.

Body temperature.—In ordinary health the temperature range is the same as at home, but exceptions are found in cases of troublesome acclimatization, especially in women, where the temperature may have as its apparent normal 99 degrees or more for a time. Excessive and prolonged exertion in a high external temperature also tends to raise the level of the clinical thermometer.

The nervous system.—In the early days of tropical residence, there is often a definite stimulation with increased mental activity and bodily alertness. Later there is almost invariably a depression of nerve-cell function, and in many cases a continuous state of nerve exhaustion with an ensuing neurasthenia which is of a definite tropical type. Such cases occur, on the one hand, in overworked business men, planters, civil servants, etc., and on the other hand in men or women who live fast and over-indulge in alcohol and have generally a good time. The sequences are, brain fag, loss of memory, general irritability, and to use the popular term, biliousness (this is more often a purely nervous condition resulting from impaired nerve controls). One of the important causes of tropical neurasthenia, and a cause often overlooked, is the fact that sleep, owing to the high night temperature, and the environment of stuffy, airless beds surrounded by somewhat impervious muslin curtains, is very apt to be broken and restless. The state of unconsciousness which should be unbroken is frequently incomplete and some of the important nerve centres are half awake and discharging energy, and consequently lack opportunities for proper recuperation. This factor is of greater importance in these days than formerly, and more so among business men, for their hours are as long as at home and the old afternoon siesta is a thing of the past.

The urinary system.—There is a marked diminution in the quantity of reaction with a corresponding diminution in the totals of the normal excretion products, urea, chlorides, etc. There is therefore a resulting excess of work thrown on the liver. The moral is, that for the European a large amount of fluid is required daily and the "east-of-Suez" thirst appears to be not without some good reason for its gratification. It has always appeared to me that the individual who follows the social customs of the equatorial tropics in reason and takes an average quantity of the ordinary highly diluted whisky and soda will keep his kidneys sufficiently flushed and a good head of pressure in the arterioles of the excreting glomeruli with a resulting level of general good health which to a very great extent nullifies the poisonous effect of the alcohol consumed. On the other hand, the total abstainer very frequently drinks far too little fluid and his urinary excretion is often very scanty, with consequent serious results on his general health and well-being. I am convinced that this is the explanation of the widespread belief that teetotalers do not stand a tropical climate so well as the man who takes alcohol. It also explains, to a great extent, that often the hard drinker enjoys the best of health and is often long lived, as long as he remains in the tropics. This immunity is generally lost if he returns to a temperate climate.

The blood.—There is generally a decrease in the amount of hæmoglobin. Some years ago I made an investigation in a large number of cases, both Europeans and natives (using Sahli's hæmoglobinometer). I found:—(1) An average reduction of 10 per cent. to 15 per cent. in Europeans of a year or more of tropical residence. An average similar reduction was the rule in the native races. (2) That the European on his first arrival from home gave approximately normal readings, but in the course of a few months these gradually decreased till a tropical normal was reached of about 80 per cent. in the male and 75 per cent. in the female. These figures are, of course, for ordinary healthy people. The blood-corpuscle count for red cells showed generally a slight reduction, but there was no change evident in the white cells.

The cutaneous system.—The excretory function of the skin is much more active in the tropics than in the temperate zones. The sweat glands are hard worked and a marked hypertrophy follows. The blood capillaries are dilated and active. Generally speaking, the skin function in hot countries has a rôle not incomparable to that of the kidneys in the colder regions. This fact is of great importance in the pathology and treatment of tropical disease, and especially of those acute conditions resulting in heat stroke, insolation, etc. The tropical pallor so characteristic of tropical residents is said to be due to a hypertrophy of the epidermal cell layer and a consequent obscuring of the capillaries in the true skin. There may be some truth in this, but my experience shows that where there is no definite anæmia, it is generally due to the universal dread of exposure to the sun, and this is especially true of women and children. They remain indoors most of the day till the sun is low down on the horizon. On the other hand, planters, sailors, soldiers, and outdoor workers generally, rarely show this pallor. There is no doubt that the avoidance of sun exposure is carried too far, to the serious detriment of health and vigour, and this is especially true in the case of children.

On the other hand, investigation shows that tropical sunlight has its very injurious side due to the excess action of the ultra-violet-end rays of the solar spectrum. Over-exposure to these rays has a direct pathological effect on the nervous system and produces definite morbid phenomena such as general debility, anæmia,

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and various nervous dyscrasies. Though the path of penetration may be general the most direct effects are on the ocular tissues. Conditions such as conjunctival congestion with a secondary œdema and microbic infection simulating an acute trachoma, are not uncommon. A ciliary congestion may result, giving the appearance of an early iritis. The common occurrence of cataract in these sun-swept regions is in my opinion often a direct sequence of the constant and continuous action of the excess ultra-violet rays in the cloudless and dazzling atmosphere.

The importance of the wet bulb thermometer.—This is undoubtedly one of the most important factors in the attainment of physical well-being or otherwise in the tropics. We have frequently torrential rains and a resulting high humidity of the atmosphere, and it must be remembered that the higher the temperature the larger the amount of moisture the air can absorb and retain. Therefore a high wet bulb thermometer involves serious deleterious effects on the animal functions especially that of the toxin-elimination mechanism. The important avenue of the skin excretory apparatus is liable to be thrown out of gear and consequently extra work is thrown upon the excretory function of the lung, and the hot, damp air with little stimulative power further handicaps this important lung function, and with these two important excretory organs clogged and inefficient, an acute or subacute intoxication results with a general malaise, a rapid high-tension pulse, intense headache, and often syncope. How can we prevent this vicious circle? Nature helps by the passage of those great air currents, the trade winds or monsoons, or the local *sumatras, pamperras,* etc., which are the salvation of the moisture-laden regions adjacent to the tropical seas, and the dwellers in these countries must follow the leading of nature by the provision of free and untrammelled ventilation wherever possible, open spaces, wide streets, lofty airy rooms, the avoidance of a near pallisade of trees and other vegetation which screen dwelling houses from the free access of air. The universal use of electric fans or the punkah are most helpful in maintaining a high standard of health and efficiency in warm countries, for if the air is kept in gentle continuous motion the deleterious effects of hot, moist, still air are largely neutralized. Where possible the overhead electric fan is by far the most efficient form of ventilation and air stirrer, but it must be carefully placed and revolved at a suitable speed. The object is not to produce a chilling draught but a gentle steady breeze well overhead.

The following are brief notes on some common bacterial diseases from the point of view of their modification by the conditions of the tropical environment.

Septic infections.—These generally follow the same course and development as in the colder zones, and wound infections and suppurations can be dealt with as efficiently by modern methods in the tropics as at home. It is to be noted, however, that owing to the favourable surroundings of heat and moisture the development and growth of organisms on cutaneous and mucous surfaces is much more rapid. On the other hand, the possibilities of air infection are considerably less owing to the strong antiseptic power of direct intense sunlight and the free movement of pure atmospheric air currents.

Tubercle in the tropics.—In these regions the infection of man by the tubercle bacillus is widespread and deadly and in certain areas and under certain conditions assumes the virulence of an epidemic. There are some points of great interest. The first is the almost total absence of surgical tuberculosis in many areas. Twenty years in a large general practice gave me about half a dozen cases of bone or joint tubercle. One must associate this fact with the almost total absence of animal infection in the Malay peninsula. Another factor may be that among the native population milk is an uncommon article of diet. (Glandular enlargements are common, but these are generally of septic or specific origin.)

The common type of the disease is invariably the pulmonary, and this is frequently of the acute fulminating type with disseminated tubercles throughout the lung and a secondary general infection. For many years tuberculosis has held the leading place in the death returns throughout the Malay peninsula, and even that is not the whole story, for unquestionably hundreds of cases are returned under the heading of some other disease, such as fever or malaria. The infection is almost invariably due to direct contact with a previous case of the disease, and it could scarcely be otherwise. There is always a chronic and intense overcrowding of the native population. Every aperture of ventilation at night is carefully closed. There is a widespread fear of night air and indeed of cool air at any time. The basis for this in the native mentality is probably the association of open doors and windows with the entrance of mosquitoes and a following malarial infection, and there is also the possibility of a chill producing a dysenteric attack or some similar condition.

Pneumonia.—In the tropics the organisms of pneumonia are as frequently present in the human tissues as elsewhere, yet the incidence of the acute lobar fulminating type of infection is not common. When lobar infection is met with it is chiefly of the subacute asthenic type, and is frequently seen in badly nourished cachectic malarial subjects. The explanation for this anomaly is probably the equable warm environment and the absence of the factor of chill. When the typical pneumonia of the temperate zone occurs it is commonly of the rapidly-fatal alcoholic variety.

There is a type of pneumonic infection which I have met with in the tropics and never at home. This is characterized by a general malaise, with a slight rise of temperature, cough with a muco-purulent sputum and this on microscopic examination shows an almost pure infection of the pneumococcus. There are indefinite physical signs, but usually some slight dulness at a lung base with impaired respiratory sounds and increase of the vocal resonance. It is not a broncho-pneumonia, for it is definitely localized. The patient is often well enough to go about, but is generally run down and out of sorts. The condition suggests a tuberculous infection and is often mistaken for such. Under suitable treatment the physical signs clear up, and the pneumococci disappear from the sputum. There is, however, a tendency to relapse and a change home is generally advisable. I have seen one such case develop a rapidly fatal lobar pneumonia of the ordinary type.

Venereal disease.—Gonorrhœa is as universal a complaint and as devastating in its results as it is elsewhere in the world. I wish, however, to point out one or two modifications:—(1) In certain races, especially in Malays and Arabs, the florid fulminating type is not common. The initial infection more often takes on and maintains the aspect of a chronic gleet and complications are rare. These facts point to a development of racial immunity. In the Chinese, on the other hand, the disease is of the common type with the usual sequelæ. (2) The large proportion of gonorrhœal ophthalmia met with, both of the infantile and adult forms, is due to the large number of carriers and the lack of ordinary cleanliness and basal hygiene. (3) The extraordinary frequency of chronic gonorrhœal endocervicitis in women of all races, which has the frequent complication of a secondary subacute inflammation of fibrous tissues, is often accompanied by a low running temperature. The whole forms a complex disease difficult of diagnosis.

In regard to syphilis, the chief modifications that one has noticed in the tropics are:—(1) The para-syphilitic diseases as locomotor ataxia and general paralysis of the insane are rarely met with, at least in the Far Eastern tropics. This is especially true of the Chinese race. In a term of office as one of the Government Visitors to the asylum in Singapore this fact was very evident in the records of this institution. (2) Taking into consideration the enormous number of cases met with both in general practice and in hospital, gumma formation is not common, but syphilitic disease of the

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skin in its myriad forms occurs much more frequently than in the temperate climates. (3) A not unusual variation is an infection without a noticeable initial chancre.

Leprosy.—Why is leprosy now practically confined to the tropics? Is there an intermediate host which in these days is more commonly found in these regions? One associates the question with the kindred one of plague which is now to all intents a tropical disease. There may be for leprosy a corresponding intermediate host to that of the rat flea for plague. On the face of it, however, one is bound to regard the determining factor in both diseases as a question of ordinary hygiene and common cleanliness. I have no doubt, as the result of my long experience, that leprosy is infectious only by intimate contact with the infecting person and whatever the connecting link between the infector and infected, it is certainly often absent and infection may not take place at all or only after a very prolonged interval.

Typhoid and allied infections.—These diseases, being associated with imperfect hygienic conditions, are naturally widespread in tropical countries. Reliable statistics are, however, difficult to obtain for the symptoms merge into so many possibilities of error unless the observer is thoroughly trained, and in these regions he is frequently not so. The extent of typhoid infection and its allied pathological brotherhood among the native eastern races is thus difficult to ascertain and many different opinions are held. My own experience and investigation has taught me that there is a large incidence of such infections among the young children of these peoples, and possibly there is a parallel development of a widespread immunity among the adult members of the community. Also in this connection the question of dietary infection is of interest, for one has to remember that the use of milk, other than human, in these races is almost unknown. Another reason is the universal use in the Mongolian peoples of that sterile beverage, tea infusion, in place of unboiled water of dubious quality. In this connection I would like to point out that the large increase in the use of sterilized tinned milk in the last twenty years by the European population in the Far East is responsible for much of the marked decrease of typhoid fever in this class. In my early years of practice in Singapore, which was towards the close of the last century, when the native milkman with all his vile arts was the sole source of the milk supply of this important centre, typhoid fever was rampant in the European population. In my war service in Malta, twenty years later, I found that a similar victory over the infection of Malta fever had been gained by the prohibition of all save tinned milk throughout all ranks of the garrison community.

Conclusion.—In conclusion, the whole prospects of the advancement in knowledge of the problems of tropical medicine will, as in the past, be on the lines of a thorough understanding of the modifying conditions of the tropical environment in its many aspects, and while the scientist in the laboratory or in the field works in the first line of advance, it is to the tropical general practitioner that we have to look for the consolidation of the positions won.

Reviews.

TROPICAL HYGIENE.—By The late Surgeon-General Sir Pardey Lukis, K.C.S.I., and Colonel R. J. Blackham, C.B., C.M.G., C.I.E., D.S.O., M.D., M.R.C.P.E., F.R.F.P.S., D.P.H. Revised and Enlarged by Lieutenant-Colonel A. D. Stewart, M.B., F.R.C.S.E., D.P.H., D.T.M. & H., I.M.S. Fourth Edition. Calcutta: Thacker, Spink and Co., Ltd. (For the St. John Ambulance Association, Indian Council), 1931. Pp. xi plus 441, with 79 illustrations. Price, Rs. 5.

THIS is more than an ordinary revision; the book has been reconstituted and brought up to date throughout, and the opportunity has been taken to produce a volume of a more convenient size.

The original object of providing a textbook for the hygiene course of the St. John Ambulance Association has been retained, but the new volume covers much more ground and should appeal to a wider circle of readers than its predecessor.

An excellent introductory chapter gives a short history of public health development in England and India. This is followed by two long chapters devoted to the communicable diseases; paragraphs on sprue, filariasis, relapsing fever, leprosy and typhus having been added in the present edition. Following communicable diseases come chapters on environmental and community hygiene, finishing up with a short chapter on personal hygiene. The reviewer thinks that the communicable diseases are better dealt with after the more general subjects of water, air, food, housing, etc., but Colonel Stewart has adhered to the original plan of the book in this matter.

Curiously enough hydrophobia is dealt with out of its logical place and is given a chapter to itself, while malaria—the greatest single cause of sickness in the tropics—is lumped together with seven other diseases.

New material added includes useful chapters on camp sanitation, and maternity and child welfare, while an interesting section on international health relationships is tucked away in chapter XV and not mentioned in the "table of contents."

The book is full of well-chosen information, is not too technical, and reads well. Though not primarily intended for the purpose, it should be of great value to undergraduates, sanitary inspectors, and health visitors. The layman interested in the theory or practice of health in the tropics should be advised to get a copy of Lukis and Blackham's "Tropical Hygiene."

G. G. J.

THE MODERN THERAPEUTICS OF INTERNAL DISEASES.—By A. P. Cawadias, O.B.E., M.D. (Durh. and Paris), M.R.C.P. (Lond.). London: Messrs. Baillière, Tindall and Cox, 1931. Pp. xi plus 147, with 3 figures in the text. Price, 10s. 6d. net.

THIS book is a philosophic consideration of the general principles of diagnosis and treatment. The author, supported by a number of continental authorities, urges a revival of what is termed Neo-Hippocratism, the sum and substance of which is the individualization of each patient, his consideration in all aspects, the surroundings, the ætiological, psychological, constitutional and hereditary factors, as opposed to treatment based on what he terms nosographical classification and exclusive attention to organ syndromes.

In the elaboration of this thesis, after discussion on the mechanism of integration of the body, it is suggested that the transition of the individual from health to disease depends on the interplay of a series of factors:—(1) External ætiological factors; (2) constitutional factors; (3) the psycho-neuro-endocrinic syndrome determined by the interplay of factors 1 and 2. These three lead to the production of (4) organ localization or organ syndromes. To the above are added two further factors, heredity and environment. On this subject the author emphasizes the importance of the psyche and the practical importance of psychological medicine to the internist.

After the complete investigation of all these points, the next point in logical sequence is to allot to the ætiological factors their correct proportional influence. Failure to do this leads to faulty diagnosis and treatment. On the subject of treatment, which is inseparable from diagnosis as the latter must be re-adjusted throughout the course of the disease, the view is put forward that all therapeutic agents have a predominantly specific action. This view, even if not accepted in its entirety, certainly tends to method in prescribing, which is expressed as follows:—"Every administration of drugs must be fully justified and

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Extract from the *Medical Journal of Australia*, October 4, 1930.
(The Official Journal of the B. M. A. in Australia.)

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strictly individualized." Mobilization of the whole therapeutic armament is advocated. "We do not treat an individual with one therapeutic method, but with a constellation of therapeutic factors."

The final chapter, a discussion on those qualities and assets which go to make the successful physician, is interesting. The book, though opening out new lines of thought and containing much that should be considered, loses value by being difficult to read; it is in places obscure, redundant and sometimes self-contradictory. Such sentences as the following tend rather to alienate the sympathy of the reader:—"Whereas internal medicine in our days has become more synthetic, surgery has become more analytical." "As there are no diseases but only diseased individuals, disease cannot be treated and thus the nosographical method of diagnosis leads to therapeutic nihilism." "In the same manner as many physicians who diagnose pneumonia do not realise that they are really placing a fictional label on the patients."

Many physicians who may be ready to accept the general precepts of this book will find it difficult to subscribe to such views as the above. Further, the division of diseases into internal and external, the former including the whole province of the physician, the latter, surgical diseases, will not appeal. The author's explanation of this division seems to express a desire to relegate surgery to the skilled craftsman and to ignore the modern tendency of the two sciences to grow increasingly interdependent.

E. H. V. H.

MEDICINE: DISEASES OF THE ALIMENTARY TRACT. Third Edition. (Catechism Series.) Part III. Edinburgh: E. & S. Livingstone. Pp. from 193 to 280. Price, 1s. 6d. net. Postage, 2d.

This little volume deals with the diseases of the alimentary tract in the form of questions and answers. The book is quite useful for those appearing for the school final examination.

S. P. B.

PROCTOLOGY.—By Frank C. Yeomans, A.B., M.D., F.A.C.S. London and New York: D. Appleton and Company, 1929. Pp. xxi plus 661, with 417 illustrations and 4 coloured plates. Price, 45s. net.

This book claims to be a treatise on the malformations, injuries, and diseases of the rectum, anus and pelvic colon. The author bases his work on twenty-six years' clinical experience in hospital and private practice.

There are thirty-five chapters, divided up as follows:—The first four deal with anatomy and physiology, embryology, diagnostic methods, and anæsthesia; chapters 5 to 35 describe the various malformations, diseases, and injuries of the parts concerned, beginning with constipation and fæcal impaction, and ending with foreign bodies in the rectum and sigmoid colon.

A very thorough description is given of proctology as it is understood and practised in America, and this differs in but few respects from the accepted teaching in England. Hæmorrhoids, for instance, are treated radically in England by the ligature method; in America, the clamp and cautery method is generally preferred. The injection treatment is also very popular, but the author believes that only about 50 per cent. of cases are suitable for such treatment, while recurrence is estimated to occur in two to five years in about 15 per cent. of cases. A 10 per cent. solution of phenol, glycerine, and aqua destillata is recommended, but it is stated that quinine and urea solution is growing in popularity. No anæsthetic is necessary for this almost painless procedure, but the merits of local novocain anæsthesia and sacral block are recognised for operations on hæmorrhoids and other local conditions.

The chapters on other affections of the rectum and pelvic colon are evidently based on clinical experience, and directions as regards diagnosis and treatment are particularly stressed. Over one hundred pages are employed in dealing with malignant growths. The four coloured plates are excellent, and the numerous drawings and other illustrations amply elucidate the various sections.

This treatise on proctology can be thoroughly recommended to students and practitioners, and especially to those who specialise on this subject. References to the work and statistics of other surgeons will be found very useful.

Everyone will not agree with the statement of the author on page 141 that the reference to "emrods" in the Old Testament has any connection with the subject of piles. In describing caudal appendages a photograph is shown of such a case, and it is stated that it is an example of "true tail" with elements of bone and cartilage in it. Bland-Sutton, however, states that a so-called "tail" with elements of bone and cartilage has never been described.

F. P. C.

THE BIBLIOGRAPHY OF SCHISTOSOMIASIS.—By Mohamed Bey Khalil, M.D. (Egypt), Ph.D. (Lond.), M.D. (Brux.), M.R.C.P. (Lond.), D.P.H. (Oxon.), D.T.M. & H. (Eng.). (The Faculty of Medicine Publication No. 1.) Cairo: Published by the Egyptian University, 1930. Pp. 506. Price, 6s. net.

According to the preface this publication gives the references up to the end of 1930. It is not claimed that they are complete, but it is difficult to imagine that any important references have been missed in a work of such dimensions.

The book is divided into two parts. In the first part all the references are placed alphabetically according to authors, and in the second part they are divided under headings dealing with different aspects of the subject. It is a book that will greatly lessen the labour of anyone wishing to consult the literature on schistosomiasis, as a whole or from any special angle. The number of errata is eighty-three, which is somewhat large, and it is hoped these will be removed in the second edition, which is promised at an early date.

P. A. M.

YOUR SERVANT THE DOCTOR.—By "G. P." (W. B. Cosens). London: John Bale, Sons & Danielsson, Ltd., 1931. Pp. 192. Price, 7s. 6d. net.

Until very recent times general practitioners have, as a class, been disappointingly inarticulate. There are doubtless many reasons why this should have been so. The general practitioner in active work is much too busy to translate the events of an often rich experience into the printed word; in retirement the trouble may have been twofold, either impaired health as a result of a lifetime of arduous work or, in the case of the relatively few who live to enjoy the evening of life, a hyper-sensitiveness regarding their literary shortcomings.

Writers of medical books are roughly of two classes: (*a*) those who by long and intensive study of one particular branch of medicine or the allied sciences have acquired the undoubted right to speak authoritatively on their particular subject, and (*b*) those to whom the authorship of a textbook or monograph is as necessary for their material welfare as an address in the appropriate quarter of London, a footman, and an honorary appointment to a Very Exalted Personage. The general practitioner is over-modest of his claims to be considered a member of the first class, and in his infrequent moments of prayer thanks God that he cannot possibly be included in the second.

Just lately, however, there has been a change and the general practitioner is at last making a very welcome appearance in the ranks of useful medical writers. On the very first page of the book under review there are symptoms of the hyper-sensitiveness mentioned above, for the author, Dr. W. B. Cosens, starts off by remarking, quite unnecessarily as it happens, that "I make no pretence to style or composition and my

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grammar is faulty." The author ranges over a variety of subjects in a delightfully whimsical and intimate manner—the defects of modern education, and of modern dress; the virtues of the medical research worker, and the vices of the psycho-analyst whom, with the osteopath "and the like exudates from the great medical profession" he would consign to the drain!

Dr. Cosens is, on occasions, a hard hitter and his views will not meet with universal acceptance, but nobody will question his honesty and we rather suspect he is not averse to a "scrap" for its own sake. A delightful olla podrida.

J. M. H.

A SIMPLE METHOD OF WATER ANALYSIS.—By J. C. Thresh, M.D. (Vic.), D.Sc. (Lond.), D.P.H. (Camb.), and J. F. Beale, M.A. (Camb.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (Oxon.). Tenth Edition. London: J. & A. Churchill, 1931. Pp. 69. Price, 3s. net.

THE methods described are intended for use with the water analysis case of Soloid products supplied by Messrs. Burroughs Wellcome and Co. The methods are standard, clearly described and discussed, and the book contains a clear and succinct account of the methods of chemical analysis of water and sewage, and is of value apart from the description of the use of the Soloid products. As the book was not accompanied by the Soloid box, it was not possible to put the methods to practical test. We believe the box is used in the army and will be of undoubted use to health officers in outlying districts far from laboratories. The value in India of such methods depends on the keeping qualities of the Soloids. This aspect is not discussed in the booklet.

A. D. S.

INTERNATIONAL CLINICS. A QUARTERLY. 41ST SERIES. VOL. II.—Edited by Henry W. Cattell, A.M., M.D. London: J. B. Lippincott Company, 1931. Pp. viii plus 307. Illustrated. Price, 12s. 6d. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 9-6.

THE second volume opens with a collection of clinical papers from the department of medicine, Tulane University, New Orleans. Matas gives an interesting review of the subject of the present status of the post-operative pneumopathies; they are classified as follows:—(1) Inflammatory; (2) those due to thrombosis, embolus or infarction; and (3) atelectatic. Statistics demonstrating the relatively high incidence of such conditions after abdominal operations in the subphrenic area are submitted. A summary is given of the work of Luisada with the electro-bronchograph, demonstrating the importance of the abdomino-pulmonary reflex and its suppression in splanchnic anæsthesia.

"The clinic patient with special reference to dyspeptic symptoms" by Meyers and Sandweiss is an analysis of the results of a careful enquiry into the basic condition of what in student days we should have termed out-patient chronics, and points out that in these subjects who, on account of their manifold and kaleidoscopic symptoms, are often dismissed as neurotic, the incidence of underlying organic disease is high.

Walsh, the author of "The non-heredity of disease," basing his arguments on Weissman's axiom that acquired characteristics are never inherited, seeks to dispel a number of commonly-held beliefs regarding familial transmission of disease. The arguments, contrary as they often are to impressions gained by experience, are difficult to accept unsupported by statistical enquiry. Further, no account is taken of inherited tissue proclivities or tissue weaknesses. At the same time, as the author points out, exaggerated ideas on the importance of hereditary influence do react unfavourably on the psychology of the patient and the physician should, therefore, examine carefully the grounds for such views as he may hold. "The past five years of syphilologic progress" by various authors, includes a section on fever therapy in the treatment of syphilis of the central nervous system. The treatment by malaria infection seems to hold the field, but the induction of hyperpyrexia by means of diathermy is reported to have given good results and holds out great promise.

For the rest, the number is made up of short articles on various subjects and records of unusual cases. There are number of illustrations including a good collection of photographs of the subjects of nodular leprosy.

E. H. V. H.

STATE BOARD QUESTIONS AND ANSWERS FOR NURSES.—Compiled and Edited by John A. Foote, M.D. Ninth Edition. Philadelphia and London: J. B. Lippincott Company, 1931. Pp. xiii plus 727. Price, Rs. 11-4. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

WHICH of us before taking an important examination has not begged, borrowed or paid for copies of examination questions previously set, to enable us to estimate which are the "certs" and to enable us to study the particular questions which show up the fads or idiosyncrasies of any particular examiner? For a nurse it is perhaps not easy to obtain copies of papers previously set. In Bengal the only official publication which contains these papers was last published in 1928. This is now out of print and it only contained the Nursing Examination questions for April and October 1927.

The questions that one can ask a nurse to answer in any particular subject in a written paper are distinctly limited in number, as except in the subject of nursing itself the knowledge of ancillary sciences she can acquire in the short course of training laid down can only be very superficial.

It is, thus, possible to compile in a single volume most of the questions that can be set in any particular subject. The wording of the questions may be twisted round in various ways, but the fundamental question remains the same.

This book contains a good selection of most of the questions that can be asked in connection with examinations for all branches of the nursing profession. Not only does it give the question, but it also supplies the answer. The book can thus be used as a revision reader for the student nurse, and will present in many cases the subject in which she is interested in a totally different light, and probably looked at from the examiner's angle.

The book, as a whole, is well compiled; it has been written mainly for American nurses, but it will also be useful for English-speaking nurses, as the courses of training laid down are very much alike.

Occasional errors are to be found and the book starts badly with an error on the first page. Here we find "S. O. S.," the abbreviation used in prescriptions for the Latin words "si opus sit" (meaning "if the occasion arises" or "if necessary"), actually given as "sic opus sic."

On page 69 the question "To what class of bones does the patella belong?" is answered by "The patella is a flat bone." Obviously the correct answer is "A sesamoid bone."

On page 74 we have "What effect has curvature of the spine on the general health?" The answer given is:—"Curvature of the spine to any degree impairs the general health by an interference with respiration, and in other ways." The last four words as part of a model answer are, to put it mildly, very weak, and are apt to encourage loose thinking.

These are just three questions picked at random, but there is a sufficiency of good questions and answers to make up for many of the poor and undesirable examples.

At the end of the book examples are given of what are termed "The newer type of question." These types

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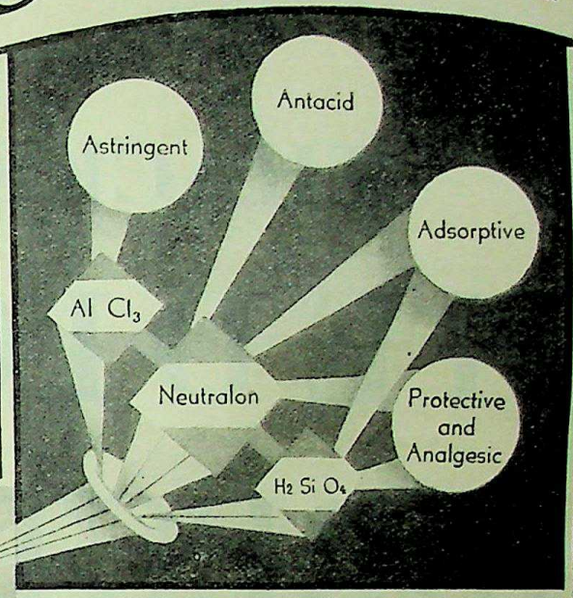

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have been used in several of the American States and at present must be looked upon as an interesting psychological experiment. They all enable the candidate to answer the questions in one or two words. This, however, gives the examiner much more work in thinking out and setting his questions and as most examiners in India are busy men with other work to do they are not likely to become popular here for some time. At $3.50 the book is a trifle expensive for the average nurse in training in India, but it could usefully be added to the nurses' hospital library.

J. F. C.

RESTORATION EXERCISES FOR WOMEN.—By E. A. Hornibrook. London: William Heinemann (Medical Books), Ltd., 1931. Pp. 95. Illustrated. Price, 5s. net.

THIS book should be useful to European women in India. The regular practice of a suitable selection of the exercises given in the book will undoubtedly improve a woman's physical efficiency. The chapter on feet exercises seems particularly useful. The footnote on page 56, "The exercises usually prescribed by doctors and nurses after childbirth are always harmful to the mother" will be very rightly challenged by many medical men and women. As the title of the book is "Restoration Exercises for Women" it is a pity that the author has omitted the "Stacey Wilson exercises" in the chapter dealing with restoration exercises after childbirth. She has dealt with the subject in a frank and open manner which makes the book interesting and useful to all women.

A. M. H.

HOME NURSING FOR INDIAN WOMEN LIVING IN INDIAN STYLE.—Compiled by Lady Petrie, and Dr. Ruth Young, M.B.E., W.M.S. St. John Ambulance Association, Indian Headquarters, New Delhi. Pp. 186. Illustrated. Price, Annas 12 only. (The book is on sale at the St. John Ambulance Stores Depot, Lahore.)

THIS small handbook (containing 185 pages in all) should fill a long-felt want. It contains very practical instructions for home nursing in Indian homes amongst all communities. It covers a large range of subjects including the structure of the human body. The latter being dealt with very simply and clearly. It should be a most useful possession in Indian homes: the cost (12 annas) bringing it within the reach of many. The vernacular translation (which is being prepared) should further extend the scope of its usefulness.

A. M. H.

MIDWIFERY FOR NURSES.—By D. Miller, M.D., F.R.C.S. (Edin.), M.R.C.P. (Edin.). London: Edward Arnold and Co., 1931. Pp. vii plus 256. Illustrated. Price, 6s. net.

As a reference book for qualified midwives and senior nurses this book should prove invaluable. It deals with all obstetric emergencies and should be a great help to midwives working in lonely districts as it indicates clearly and simply what should be done in an emergency before medical help arrives. The chapter on infant feeding is particularly good, no mention being made of the popular patent foods. The only point of criticism to be made is that under the heading of "placenta prævia" no mention is made of the use of Willett's forceps. This would seem to be a more simple procedure than either plugging the vagina or bringing down a leg, both of which are advocated. The illustrations are excellent, the printing clear and good and the book is recommended to all nurses and midwives.

A. M. H.

Annual Reports.

EXTRACTS FROM A REPORT BY MAJOR-GENERAL J. D. GRAHAM, C.B., C.I.E., K.H.S., I.M.S., PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA, AND MEMBER OF THE HEALTH COMMITTEE OF THE LEAGUE OF NATIONS, ON THE 17TH SESSION OF THE HEALTH COMMITTEE OF THE LEAGUE OF NATIONS HEALTH ORGANISATION HELD IN GENEVA, MAY 4TH TO 9TH, 1931.

DR. MADSEN presided, and the following were present:—Sir George Buchanan, Dame Janet Campbell, Professors Bordet, Cantacuzene, Fitzgerald, Jadassohn, Jorge, Miyajima, Pittaluga, Scoseria; Drs. Chodzko, Hamel, Hata, Jitta, Wuh-Lien-Teh, Lutrario, Stampar, Tsurumi, Major-General Graham and M. Velghe. Surgeon-General Cumming arrived on the 6th May. The following attended as visitors: Dr. Tuntler, Dr. Strode (Rockefeller Foundation), Dr. Morgan (Ministry of Health, Great Britain), Dr. Bilbao (Director-General of the Bolivian Health Service), Dr. Barientos (Bolivia), Dr. Abt (Office International), Dr. Prausnitz, Dr. Woker.

Agenda.—A re-grouping of the agenda shows that they consist mainly of the following:—

1. *Reports.*—

(*a*) Of the Medical Director on: (*i*) Current activities of the Health Organisation since October 1930. (*ii*) The Health Organisation during the year 1930. (*iii*) Director's second mission to China.

(*b*) Of the Advisory Council of the Eastern Bureau, Singapore.

2. Collaboration work in China, Bolivia, Greece, Liberia, Bulgaria, and Tchechoslovakia.

3. Work of Opium, Malaria, Leprosy and Fumigation Commissions.

4. Work of the Rural Hygiene Conference.

5. Work on syphilis, yellow fever, prisons, physical training, cancer, infant and maternal welfare.

6. Secretariat questions.

Opening Address.—The President opened the Session by paying a tribute to the memory of a former Member of the Committee, Professor Ascoli, who had recently died of cancer. At a later stage Professor Leon Bastianelli, Professor of Pathology at the University of Rome, was appointed in his place as Member of the Health Committee, and Dr. Lutrario was asked to carry on the duties of President of the Malaria Commission.

The President then extended a welcome to the new members and visitors.

It was intimated that, at the request of the Secretary-General, a new item had been added, for adoption, to the agenda, *i.e.*, the draft convention on the limitation of the manufacture of narcotics. This was accepted.

The President constituted a small committee to examine Dr. Faber's report on medical education in China. This consisted of Drs. Wuh-Lien-Teh, Graham, Bernard, Bordet, Cantacuzene, Fitzgerald, Jadassohn, Jorge, Tsurumi and Tuntler, with Dr. Madsen as President and Dr. Rajohman as Secretary.

Medical Director's Report.—This report was considered in detail, and, as it covers the whole range of the work of the Health Organisation, it practically covers the agenda.

Singapore Bureau.—After some general observations it was agreed to submit this report and budget to a sub-committee under Dr. Jitta, and consisting of Drs. Graham, Wuh-Lien-Teh, Miyajima, Sir George Buchanan, Lutrario and M. Velghe.

Major-General Graham spoke on this in regard to Dr. Gautier's work on the co-ordination of research, and on the reception of the Council's Yellow Fever Resolution by the Health Committee of the League, and by the "Office," and suggested that Dr. Jitta's Committee would clear up any ambiguities. It was announced

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that the Chairman of the Advisory Council of the Singapore Bureau (Dr. Van Longhuiyzen) was retiring to Europe, and that a Japanese (Dr. Uchino) had been asked to take his place as Chairman.

The report and draft resolution of the above Committee were adopted, and a resolution approving of the attitude of the Bureau in regard to yellow fever, and thanking Major-General Graham, Dr. Van Longhuiyzen, Dr. Hoops and Dr. Gautier for all their work, was accepted. The discussion on the "amaryl virus embargo" showed that there was some difference of opinion on this in Europe, *vide* the remarks of M. Velghe, Sir George Buchanan, Dr. Bordet and Dr. Cantacuzene. The criticisms of the European attitude by the Council of the Eastern Bureau had evidently caused some resentment both in the Health Committee and, later, in the "Office"; but each body took its own view of its international responsibilities, Dr. Abt stating that the "Office" could not be expected to take the initiative in the matter.

Collaboration with the Government of the Republic of China.—This paragraph in the Director's report was examined apart from the report of Dr. Faber on medical education in China which had been relegated to a small Committee. Dr. Heng Liu's note on the three years' plan was first read, and the Medical Director gave an excellent and very logical exposé of the position, showing how, despite the difficulties of war, revolution, an economy campaign, and a re-organisation of administrative procedure, progress was being made in all the main items on the original programme; these included:—

Re-organisation of the Quarantine Service.—This was going ahead; two ports had been taken over and six Chinese officers had been trained in Europe. Dr. Wuh-Lien-Teh hoped that his trained staff would take over all the other ports in two years' time; he also spoke on medical education of the reform, the report on which was still in the hands of Dr. Faber for a short period. During the present year the services of a malariologist, a sanitary engineer, a propaganda officer and a specialist in medical education would be available.

A new body, the National Economic Council, would be responsible for carrying out a three years' programme in which this medical programme would find a place and be financed. The Ministry of Finance had approved of this.

The Medical Director referred to his misgivings on the abolition of the Ministry of Health; but stated that these were unjustified, and that Government was firmly determined to carry out the programme.

Dr. Wuh-Lien-Teh expressed surprise at the unexpected success achieved, thanked the Health Committee for their sympathy and advice, and asked for kindly judgment of their initial efforts to organise national medical services.

Proposals for the creation of a Commission for the study of Chinese drugs by Dr. Miyajima.—Major-General Graham challenged the immediate need for such a Commission, though admitting the principle that it might be required when more work had been done on the subject in Japan and China. The Medical Director replied pointing out the exact position now, more especially in Japan, and stating that a large amount of work had already been done in both countries. General Graham spoke again to correct some of the distortions of his remarks, and detailed experiences on such enquiries for many years in Calcutta and in Bombay. He was asked, however, not to press his objection in view of the nature and source of the request, and he agreed not to do so on the distinct understanding that India would share in the benefits of such a Commission when appointed. He emphasized the necessity for Indian representatives, and for the inclusion of the Indian indigenous system in the scope of the enquiry. This was agreed to.

Leprosy Commission.—The first report of the Commission has now been printed up and was distributed. Dr. Burnet, the Secretary, after alluding to notes received from Drs. Miyajima, Tsurumi and Nocht which were not yet ready, gave a very clear and well-reasoned speech on the aims, objects and work accomplished by the Commission up to date, explaining in some detail the arrangement of the report. Regarding treatment and segregation, he said that neither of the two principles could well be sacrificed to the other, and that some reliance must be placed on treatment without its being possible to abandon segregation entirely, and that the Commission had adopted this point of view. The second part of the report favoured the practical point of view combined with a continuance of the system, now become classic, of interchanges and standardization of methods.

Means must now be sought for:—(1) Encouraging interchanges; (2) ensuring some uniformity and perhaps later some standardization of work; (3) publication of a year book by means of a questionnaire; (4) elaborating a programme of research, more especially on treatment and serodiagnosis, on clinical and bacteriological diagnosis, on reliable observations of actual cases, and (5) the setting up of international centres, *e.g.*, Japan, India, South America.

Dr. Nocht presented his report. It was brief and contained little that had not been said by Dr. Burnet. Dr. Tsurumi criticised the report with special reference to Japanese experience of the value of segregation which was associated with a decline in the number of lepers. The Japanese Government therefore still favour the policy of isolation with treatment, have recently revised the leprosy law and have increased the number of leprosaria. He asked for exact experiments in order to test the value of chaulmoogra oil, referred to gold and leporde-protein treatment, and suggested its study. He also mentioned various types of bacteriological and epidemiological research.

Dr. Chodzko challenged the findings but did not understand the Oriental position and got little support. Had he been able, as the Secretary pointed out, to visit a large number of countries where leprosy existed, some of his remarks might have been modified.

The Secretary replied adequately, drew attention to the "remarkable systematic enquiries carried out in India", and said that the Leprosy Commission had given proof of its courage by setting forth a system with which no hygienist would be absolutely satisfied.

Dr. Nocht said that he was becoming more and more sceptical as to the possibility of discovering any efficacious chemo-therapy or metalo-therapy for directly killing the leprosy bacilli in the body. He thought good results could be attributed to chaulmoogra oil; but, if a light stimulant and correct dosage, to increase the body resistance, could be found, the value of the oil might be greatly enhanced. He suggested investigations to try the effects of protein shock and other methods by producing slight fever and also to obtain experience of carbonic acid snow, iodine and thymol.

Dr. Jadassohn thought it would be impossible to exclude mixed cases in the terminology, and he suggested four divisions:—(1) Open; (2) nodular; (3) mixed; (4) closed. He suggested research on cuti-reaction and frequent exploratory punctures of glands, testicles, and nasal mucosa. He did not think that the chaulmoogra experiment was possible and deplored the tendency of many to change their methods too rapidly and too often. He thought potassium iodide dangerous, spoke of the possible utility of the Hermansdörfer-Sauerbrück system and the need for examining small European foci.

Major-General Graham pointed out some conclusions which he had arrived at as the result of his recent experiences on these leprosy commissions in the Orient, and insisted that as the Bangkok and Manila reports were complementary to each other, they must be read together. Drs. Jorge, Lutrario, Miyajima, Pittaluga and Cantacuzene all spoke, and the Secretary summed up, pointing out that the centre of gravity of the disease had moved to the Eastern Countries which must necessarily have the predominant say in the Leprosy Commission. The Committee then approved of the report.

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MALARIA CONTROL BY ANTI-MOSQUITO MEASURES

BY

GORDON COVELL

M.D. (Lond.), D.P.H., D.T.M. & H. (Eng.), Major, Indian Medical Service

Assistant Director, Malaria Survey of India.

PREFACE.

Since the immense importance of the rôle played by mosquitoes in the transmission of disease has come to be generally recognised, the literature dealing with the application of various anti-mosquito measures has become so extensive that it is difficult for the average malaria worker to keep in touch with the different methods advocated. In the following pages an endeavour has been made to give some account of these methods in a convenient form.

It is impossible in a work of this kind to deal really adequately with the subject of drainage, which is largely a matter for the skilled engineer, but a brief description has been given of most of the points of practical importance to the malariologist. Other important measures, such as screening, oiling and the use of Paris green have been treated in considerable detail, whilst an attempt has been made to make some reference to all the measures which have been advocated in the literature.

An important feature of the book is the bibliography, which contains 570 references to books and articles dealing with the subject. These have been arranged for convenience under headings of the various measures dealt with. A list of the sources and prices of various apparatus used in the application of anti-mosquito measures is given as an appendix.

It is hoped that the description of the various measures which have proved of practical importance will make the book of value to the man in the field, and that the bibliography will be of service to malariologists generally.

CONTENTS.

Part I.—Protection against Bites of Mosquitoes.

Part II.—Measures directed against Adult Mosquitoes.

Part III.—Measures directed against Larvæ of Mosquitoes.

Appendix.—List of Sources and Prices of Anti-Mosquito Apparatus.

Bibliography of 570 references to Literature, arranged under headings of the different subjects.

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Malaria Commission's Report.

After two meetings of the sub-committee, the Chairman (Dr. Lutrario) presented a report to the Health Committee on May 8th, in which he dealt with the special features of the work of the Committee. It was a pity that Lieutenant-Colonel Sinton, V.C., I.M.S., was unable to be present at the sub-committee and committee meetings. The special features indicated were as follows:—

(*i*) Colonel James's work on artificial infection by mosquito bites.

(*ii*) Marchoux' work on acidity effects on fecundation of the parasite.

(*iii*) Schüffner's work on the comparative efficacy of quinine and plasmochin-plus-quinine in old cases.

(*iv*) The standardization of Quinetum. This was the most important work. A sub-committee of pharmacologists, chemists and medical experts met on May 5th and 6th and produced a report. A preliminary protocol for analysing the standards had been drawn up by Giemsa, Henry and Groothoff. The result and reports were for consideration.

(*v*) Dr. Bilbao had reported on national cinchona forests in Bolivia and wished the Malaria Commission's assistance and advice later if necessary.

(*vi*) Greece reported that the new anti-malaria organisation was in close co-operation with the malarial division of the school of hygiene and the technical organisations at Athens, and malarial courses had now been started in May 1931.

(*vii*) Regarding the position of the research work on the great deltas, a discussion showed that the reports of the work on the deltas of the Ebro and Danube were ready for publication, and, when the data on the deltas of the Po, Rhine and Ganges had been collected, reports on these would follow, when conclusions could be arrived at. It was agreed that the researches should continue.

(*viii*) Housing-and-malaria data were being assembled.

(*ix*) Intensive quinine and plasmochin-plus-quinine treatment by Lieutenant-Colonel Sinton, I.M.S.

(*x*) The need of quinine by various countries is now under investigation but data were not all completed.

(*xi*) The Kina-Bureau in Rome and its work. Discussion with a suggestion regarding a probable conference on quinine.

(*xii*) Conclusions arrived at regarding Quinetum and the new nomenclature agreed on for the product containing the total alkaloids, *i.e.*, Totaquina.

Dr. Pittaluga spoke of the great value of Dr. Henry's report on the total alkaloids of quinine which would arouse keen interest. Dr. Jitta hoped that the Health Committee would examine the question of the standardization of preparations with a quinine basis. The Chairman thanked the members and the Health Committee adopted the report.

Tuberculosis.—Japan wished information regarding various points in tuberculosis, *e.g.*:—

(*a*) Cause of the fall in incidence.
(*b*) The minimum programme considered essential.
(*c*) Financial aspects.

Dr. Léon Bernard, in stating that Dr. Phillips' work on infant death rate was monumental, said that his own report would appear in October next, when he hoped that the Medical Director's first note on nutrition would appear with it.

Opium Commission Report.—In view of the delay in circulating the report, the plenary committee went into sub-committee to discuss eight draft resolutions dealing with:—

(1) British Government's observations regarding the additional exemptions under Article 8 of the Geneva Convention, 1925. This was referred to the experts.
(2) French Government's proposal. No observations.
(3) Acedicone. This was to rectify an omission.
(4) Re-examination by the Health Committee of the preliminary opinion of the Opium Commission, if a member of the Committee should happen to raise objections. Drs. Abt, Bordet, Chodzko, Sir George Buchanan, Rajchman and M. Velghe all spoke, and it was agreed to alter the last sentence of the draft.
(5) Standard tests for morphine in raw opium. No observations.
(6) Representation of the Health Committee on the body for the limitation of the manufacture of narcotic drugs. This was adopted with minor alterations.
(7) Provisions for products whose manufacture was limited. This was adopted.
(8) Supervision of all morphine derivatives not coming under the Geneva Convention, as *e.g.*, peronine and codeine. Codeine (with its derivatives dicodide, peronine and heroin), peronine and dionine were all three derivatives. The question not of control, but of the degree of control, was discussed. Dr. Wuh-Lien-Teh made a declaration on behalf of China in which he supported the "May" procedure. An amendment was put by the Medical Director, suggesting that all derivatives of morphine not coming under the Geneva Convention should be subject to control, such control to include the import certificate system; and this was adopted by a majority.

It was agreed to call attention in the Report to Mr. May's procedure and proposal. There was opposition from Germany.

Fumigation Commission.—Surgeon-General Cumming had brought over for this Commission the results of the U. S. A. work since last meeting, and more especially the results of the work of Dr. Williams, whose name was added to the Commission.

It was agreed, on Sir George Buchanan's suggestion, that an informal meeting of this Commission should be held in Paris during the session of the Office International in the following week. This took place at 35, Rue Vernet, and General Graham attended, there being also present Sir George Buchanan, Dr. Jitta, Surgeon-General Cumming, Dr. Alfaro, Dr. Stock and Dr. Boudreau.

Dr. Boudreau gave a résumé of the literature which had been lodged with the Health Section at Geneva from the U. S. A., and said it would be typed up and circulated at a subsequent date.

It was agreed that selected members of the Commission should visit the U. S. A. in the Autumn, and perhaps include Montreal in the visit, as at that time the Congress of the American Medical Association would be in Session there, and the Commission would be able to study Canada's main maritime station at Quebec. Dr. Fitzgerald extended a welcome to all who were able to come.

Dr. Bordreau intimated that there would be credits for not more than five members of whom Holland, Germany, and perhaps Spain might wish to claim three. It was suggested that Dr. Monier Williams, whose chemical work had contributed so much to a solution of the difficulties, should accompany Dr. Stock. The delegates will be arranged, however, by the Health Section of the League of Nations. Neither Sir George Buchanan nor General Graham would be able to attend.

Sir George Buchanan stressed the need for keeping the work strictly to the terms of reference of this Commission, *i.e.*, fumigation by hydrocyanic acid in loaded ships. The visit would last about three to four weeks in the U. S. A. as New Orleans would probably have to be visited.

Surgeon-General Cumming spoke regarding heart disease and its lethality, and rheumatism research in the United States, and promised a further report in the Autumn.

Dr. Carrière intimated that the Swiss Committee, which had been set up, would join the International Association for the Prevention of Rheumatism.

Drs. Hamel and Bernard both spoke, the latter insisting that cancer of the lung was on the increase.

Conclusion.—The President, after thanking all for their work and services, announced that next session would begin on 12th October and finish on the 17th October.

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ANNUAL REPORT OF THE NATIONAL ASSOCIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA (COUNTESS OF DUFFERIN'S FUND INCLUDING THE WOMEN'S MEDICAL SERVICE) FOR THE YEAR 1930.

THE most interesting feature of this report is "annexure XIV, on the Causation of Still-birth in India," which we give below, *in extenso*.

Prevention is the keynote of modern health propaganda, and in no realm of medicine are preventive methods of greater importance than in midwifery. Apart from the pressing problems of maternal mortality in child-birth, the necessity for safeguarding the life of the unborn child is being increasingly recognised, and the thinking public in India cannot fail to realise the immense, although unknown, annual loss of potential citizens through still-birth and early infantile death.

Since a knowledge of causation is an essential preliminary to adequate preventive measures, a survey of the chief factors involved was undertaken in certain areas, during the year 1929, under the auspices of the Lady Irwin Research Fund. This survey, which was part of an enquiry into maternal and infantile mortality being carried on at the Haffkine Institute, Bombay, by Dr. Margaret I. Balfour and her colleagues, comprised the detailed examination of 200 cases of still-birth and early infantile death occurring in Bombay, Calcutta, and Madras, together with the classification of over 3,700 similar cases occurring in Women's Hospitals or special wards, in 29 of the largest cities or districts of India during the same year.

The results of this enquiry, which have been embodied in detail in a Report* recently published by the Countess of Dufferin's Fund Council, are briefly summarised in the following notes. It is obvious, of course, that statistics of this type are subject to various limitations, since, for example, the enquiry only lasted for approximately one year, and was necessarily confined to urban areas, pathological examinations being practically unobtainable in rural districts. It is also obvious that certain factors which vary in different parts of India require special consideration. These factors include, for example, social and religious customs, together with diseases of pregnancy (such as eclampsia, "anæmia of pregnancy" and osteomalacia), which have a definite geographical distribution.

Certain broad facts have issued, however, from the present enquiry, at least indicating the directions in which life-saving efforts most profitably may be put forth.

With reference to both the series of 200 personally-investigated cases, and the All-India Questionnaire, the enquiry was limited to children who had reached viability, *i.e.*, who at their birth were capable of independent existence, and, since religious customs, etc., precluded the examination of consecutive cases of still-birth and neo-natal death, the pathological series necessarily contained an undue proportion of children dead for some time prior to their birth.

I.—SERIES OF 200 CASES.

We will consider in the first place, the series of 200 cases.

1. The complications of labour were the primary, or immediate cause of death in 19.5 per cent. of the cases—this percentage is much lower than the figures for All-India, but, even then, it constitutes the largest single group. These complications included deformities of the mother's bones (caused by diseases such as osteomalacia), wrong positions of the child before delivery, such as "cross-birth," or confinements necessitating the use of instruments. A very large proportion of the mothers, whose babies died as a result of malpresentation at the time of birth, had already had one or more children normally—a fact which emphasises the necessity for *every* woman being carefully examined towards the end of pregnancy, so that any abnormal position of the child may be rectified.

A frequent finding in babies dying during, or shortly after, birth is tearing of the semi-fibrous partitions within the skull, which separate the various parts of the brain. This tearing, which is almost always accompanied by hæmorrhage, is indicative of stress during birth, although by no means always fatal *per se*. A fifth of all the babies in the series dying at, or soon after, birth showed such tears, but tearing was nearly three times as frequent in babies born "feet-first," as in those normally born. It was noteworthy, however, that one-third of all the cases with such tears were apparently natural deliveries. A large number of infants with injuries within the skull also showed severe hæmorrhages in important organs such as the lungs, liver, or supra-renal glands (which are in close proximity to the kidneys).

2. Ante-partum hæmorrhage, which includes bleeding occurring accidentally before delivery, or from an abnormally-situated placenta (or "after-birth"), accounted for 13.5 per cent. of the cases. This complication, which appears to occur somewhat less frequently than in the West, is extremely fatal to the unborn child, tending to cause death from asphyxia due to the want of oxygen normally supplied *via* the maternal blood. The association of accidental hæmorrhage with malaria awaits further investigation.

3. The toxæmias of pregnancy accounted for 15.5 per cent. of the deaths in the series. This term includes diseases of obscure origin chiefly manifesting themselves by evidences of damage to the kidneys. Eclampsia, the most striking of these diseases, is characterised by convulsions, and possesses a striking geographical distribution. In the present enquiry, it accounted, in Calcutta, for ten times as many still-births and early infantile deaths as in Bombay, and for more than half again as many as in Madras. With reference to the maternal mortality in cases of eclampsia, the figure was 32.14 per cent. for Calcutta, as compared with 9.42 per cent. for Madras. Among hospital births, there was a much higher incidence of the disease among Mohammedans—a finding in accordance with the observations of other workers.

4. Syphilis, one of the great venereal diseases, was specially searched for, as a cause of still-birth and neo-natal death—the methods of enquiry including various series of blood-tests on expectant mothers, together with a detailed investigation of each of the 200 cases, for evidences of the disease. A critical survey of the results obtained will be found in the main Report, hence only the more important points are summarised here.

With regard to Bombay, out of 372 consecutive maternity cases, 13.6 per cent. of the mothers gave "positive" blood-reactions for syphilis, while in Madras, out of 1,000 similar cases, 12.5 per cent. were "positive." The figure for Calcutta (based, however, on a very small number of cases) was 13.4 per cent.

The incidence of "positive" blood-tests for women of the hospital class in Glasgow, the largest city in Scotland, was found to be between 9 per cent. and 10 per cent. (J. N. Cruikshank). It will thus be seen that these figures for the great cities (while, of course, requiring further confirmation, or the reverse) do not suggest an excessive proportion of "positives," as compared with the figure given for a Western city, although they emphasise the necessity for a continued campaign against the inroads of venereal disease. In the present series of 200 cases, the incidence of "certain" syphilis among the total infants examined, was 14.5 per cent., but including "probable" and "possible" cases, the figure was 18.5 per cent. As a "primary," or immediate cause of death, the disease accounted for only 16.5 per cent. of the series, since in several instances a syphilitic child died during, or after, birth from some cause other than syphilis. This figure of 16.5 per cent. is probably too high, since the series comprised an undue proportion of children who had been dead for some time

* "Still-birth and Neo-Natal Death in India: a Preliminary Enquiry" by Christine J. Thomson, M.D., Ph.D. (*St. A.*).

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KNOWLES (R.).—The Treatment of Intestinal Amœbiasis: (An Analysis of Results, and a Review of the Literature). By R. KNOWLES, Lieut.-Col., I.M.S., Asst. Surgeon B. M. DAS GUPTA, Asst. Surgeon AJIT KUMAR DUTT GUPTA, M.B. (Cal.), D.T.M. (Bengal) and UMAPATI GUPTA, M.B. (Cal.), D.T.M. (Bengal). From the Department of Protozoology, Calcutta School of Tropical Medicine. Re. 1-8. 1928.

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before birth—a class of case in which syphilis is frequently found.

Although the great majority of syphilitic babies are born macerated (*i.e.*, dead for some time prior to delivery), it is of importance to note that the majority of macerated babies are *not* syphilitic, for, in the present series, only slightly more than one macerated case out of every three was syphilitic—a finding in close accordance with research results in other lands. Only a careful examination of the macerated child, both by the naked eye and by the microscope, can establish the probable presence or absence of the disease.

5. In the present series, only 10.5 per cent. of the still-births and early infantile deaths could be ascribed to tropical diseases *per se*, a surprisingly low figure, in view of the prevalence of such diseases in the East. It must be remembered, however, that the inquiry was limited for all practical purposes, to urban populations, and therefore did not include malarial regions such as the Punjab.

The incidence of *malaria* (2.5 per cent.) as a primary cause of death was unavoidably under-estimated in the enquiry, since only cases where parasites were found in the maternal blood could legitimately be included. Instances of still-birth or early infantile death classified under the heading of "maternal fever of unknown origin" (2.5 per cent.) must, in some cases at least, have been due to malaria. Eighty-three placentas (or "after-births") were examined in Bombay for malaria, and of these, 3.6 per cent. showed parasites.

Although "*anæmia of pregnancy*" is one of the most formidable causes of maternal mortality in India, this disease only accounted for 2 per cent. of the deaths in the series. This figure, for various reasons discussed in the report, is probably an under-estimate of the true incidence as, for the year 1928, the percentage was 7.5 in a similar series of cases occurring at the largest maternity hospital in Calcutta.

"Anæmia" (of uncertain origin) accounted for 1 per cent. of the deaths. No still-birth nor early infantile death occurred in the present series from *osteomalacia* (a disease commonly causing deformity of the bones of the mother) but it must be remembered that the majority of the examinations were carried out in Southern India where the disease is very rare. Numbers of cases were of course reported from other parts of India, *via* the Questionnaire.

Dysentery and "acute enteritis" were responsible for 2.5 per cent. of the cases, while a further 2.5 per cent. were due to acute or chronic maternal disease such as pneumonia, or valvular disease of the heart.

Ancylostomiasis (or hookworm disease) did not account for any of the deaths under investigation; nor were any of the cases due to kala-azar, beri-beri, or other specifically tropical disease.

6. Eight per cent. of the deaths in the series were due to "fœtal states"—a term including monstrosities and obscure diseases of the child or its appendages, originating before birth. Syphilis appeared to play no part in the causation of these conditions. A feature of considerable interest in the present enquiry was the relatively large number of cases showing malformation or disease of the urinary tract.

7. Diseases of the placenta (or "after-birth") accounted primarily for 5.5 per cent. of the deaths. Out of a total of 144 placentas examined, no fewer than 57 showed evidence of gross disease or abnormality. An interesting finding, in connection with all the placentas investigated, was the presence of an excess of white blood-cells in no fewer than 10.4 per cent. of the specimens examined. The subject is worthy of further enquiry, since the placenta is the most important organ of the unborn child.

8. Prematurity *per se* was responsible for 3.5 per cent. of the deaths under investigation, but the Questionnaire figures for All-India (not based, however, on pathological examinations) showed a much higher incidence than this.

In a series of 1,077 consecutive deliveries in Calcutta (including both live-births and still-births), 18.2 per cent. of the total were prematurely born—the proportions, according to community, varying from 9.8 per cent. for Europeans and Anglo-Indians, to 39.4 per cent. for Mohammedans (who, however, formed a very small proportion of the total deliveries). The figures for Hindus and Indian Christians were intermediate, being 23.6 per cent. and 20.4 per cent., respectively.

With reference to still-births and neo-natal deaths only—out of 1,561 cases occurring in Bombay, Madras and Calcutta, the percentages of such children, prematurely born, were 64.5, 64.4, and 59.2 for the three cities, respectively.

9. In the present series, 2 per cent. of the cases were due to "neo-natal states," or diseases occurring shortly after birth, such as "pneumonia of the new-born." It should be noted, however, that in certain cases where delivery is unduly prolonged, babies may actually be born suffering from pneumonia.

10. Three per cent. of the cases in the series had to be classified under "macerated—cause unknown."

II.—All-India Questionnaire.

This Questionnaire, regarding cases of still-birth and neo-natal death occurring among hospital in-patients for the year 1929, was sent out to all the women's hospitals administered by the Countess of Dufferin's Fund, while additional copies were forwarded to a number of Government and Mission hospitals throughout the country. The data obtained were relative to 3,715 cases which had not, of course, been subjected to pathological examination, and hence statistics regarding clinically recognisable conditions, such as the complications of labour, ante-partum hæmorrhage, eclampsia, and monstrosities, were more scientifically reliable than figures relating to various other conditions.

Percentages dealing with the primary causes of death were found to differ widely for the various districts of India, but the main findings are very briefly summarised, as follows:—

1. In 24 out of the 29 tabulated districts, the figures for deaths due to the complications of labour appeared to be definitely higher than in the West, while in the remaining five districts (including Bombay, Calcutta, and Madras), the figures closely approximated to Western findings of over 33 per cent. These data are somewhat surprising in a land where child-birth is generally recognised to be easy.

2. Ante-partum hæmorrhage showed, in general, a much lower incidence than in the West.

3. The same statement holds good for the toxæmias of pregnancy, with several exceptions, notably Calcutta. The percentages for Delhi and Agra were exceptionally small.

4. The very low figures for syphilis, in the Questionnaire returns, were clearly an under-statement, since a considerable proportion of the macerated babies classified under "cause unknown" must have died from this disease.

5. The incidence of "acute maternal disease" (mainly tropical) as a primary cause of still-birth and neo-natal death was of course much higher for All-India, than for Western countries—the figures varying from 11 per cent. to 18 per cent. for the great cities, as compared with, for example, a British figure of 2.6 per cent. The highest percentages were found in Karachi and Shikarpur, although the series in both cities was small. Many early infantile deaths occurred in Bombay, as a result of maternal malaria.

6. Deformities and obscure diseases of the dead-born child do not appear to be more prevalent in India than in the West.

7. With reference to prematurity *per se*, the Questionnaire figures tend to show that a considerably higher percentage die from marked prematurity in India than in Western lands. The largest Indian cities showed figures varying from 12 per cent. to 17 per cent., as compared, for example, with 3.2 per cent. for Great Britain.

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8. Data relative to "neo-natal conditions" were obviously of doubtful value in the absence of pathological examinations, but it is of interest to note that of the total early infantile deaths tabulated from all causes, 87.22 per cent. occurred in the first week of life, while 37.88 per cent. took place in the first 24 hours of existence.

9. Practically no All-India Questionnaire cases were returned diagnosed as due to "placental disease."

10. The percentage of macerated babies dying from "causes unknown," varied greatly in the different districts.

With reference to community, in the majority of places, the still-birth rate among Mohammedans was, in general, significantly higher than among Hindus, while, with the exception of Lahore, the figure for "Christians and others" was the lowest of the three communities.

Additional data regarding the investigation, together with a review of work already carried out in India and in other lands, suggestions for further research, and acknowledgments of the help freely given during the course of the enquiry will be found in the main report just published.

The figures adduced show, however, the great need for skilled ante-natal care of the expectant mother. Only as the public realise the necessity for such care, and consequently demand it, will the still-birth and early infantile death-rate from such generally preventable causes as the complications of labour, eclampsia and syphilis be substantially diminished.

A PRELIMINARY REPORT ON THE PREVALENCE OF INFANTILE BILIARY CIRRHOSIS IN THE MYSORE STATE. BANGALORE: PRINTED AT THE GOVERNMENT PRESS, 1931.

THIS report is of interest to the people of Mysore in giving a general survey of the incidence of infantile biliary cirrhosis in the various districts in the State. We do not quite see how a correct survey could be done within a period of 6 months as there is no sure criterion on which a diagnosis can be made. It is often necessary to change the diagnosis of infantile biliary cirrhosis after observation and careful clinical examinations. The observation that the disease is related to heavy rainfall requires confirmation; it is not the case in Bengal.

In the laboratory notes the author says that in the early stages there is a lymphocyte increase at the expense of the polymorphonuclear leucocytes. The total counts that he reports correspond to the usual findings. There is a leucocytosis in a large number of cases and in late cases the white-cell count is greatly increased. He reports one case in which there was a count of 78,500 white blood corpuscles per c.mm. with 3,000,000 red blood corpuscles; there seems reason to doubt whether this was a case of cirrhosis of the liver, or one of leukæmia. The differential count of increased lymphocytes at the expense of polymorphonuclears is normal in children, and we have found in Bengal that the normal count is 4,500,000 to 5,000,000 red blood corpuscles and 10,000, or even more, white blood corpuscles per c.mm. in quite healthy infants.

The prevalence of the disease amongst Brahmins, observed by the author, is not seen in Bengal where we have found cases amongst all castes with the exception of the labouring classes. So the high incidence amongst Brahmin children must be due to some peculiarity *in their diet*. The diet as the causative factor has been dismissed in a casual way.

In the section on treatment the author has given a table showing the cure rate. This is shown to be high with a certain Ayurvedic drug (Vjayanagaram Pandit's specific), but he does not seem to know the composition of the specific. This observation is hardly to be relied upon in the absence of control cases. But as this is a preliminary report we will wait with interest for further dissertations.

S. P. B.

Correspondence.

ON THE PRESENCE OF A FILARIAL WORM IN A TUMOUR REMOVED FROM THE LEFT SIDE OF THE NOSE OF A CHILD.

To the Editor, THE INDIAN MEDICAL GAZETTE.

DEAR SIR,—With reference to my paper on "On the Presence of a Filarial Worm in a Tumour removed from the Left Side of the Nose of a Child" published in the October number of the *Gazette*, I think that the structures that appeared to be sheaths in the Giemsa-stained sections are really degenerated worms. This will necessarily mean a revision of my suggestions as to classification. Meanwhile I must thank Lieutenant-Colonel Acton, Director of the Calcutta School of Tropical Medicine, for expressing his opinion that the lesion, as seen in the slides sent to him, resembles these produced by the *Onchocerca cæcutiens*. To a large measure this suggestion was responsible for a further scrutiny of the embryos.—Yours, etc.,

A. J. NORONHA, M.D.,
Pathologist.

29, CIVIL LINES,
POONA,
27th September, 1931.

CHOLOGEN TREATMENT FOR CHOLELITHIASIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In this country where surgical operations are unpopular and often fraught with great danger it is most useful to have in hand medicinal measures for the treatment of what is usually a surgical case.

A Russian physician recommended to me the "Chologen treatment" for cholelithiasis. This treatment is carried out in Germany very frequently. I have tried it in two cases with excellent results, and I know of a third case in which the result was quite as good. On inquiry from many doctors I have not found that it is at all well known to the profession out here, or indeed in England.

A pamphlet "Recent Medical Experiences with Chologen in the Treatment of Cholelithiasis" gives a very exhaustive description of the treatment, with notes on cases treated by such well-known physicians as Dr. Robert Glaser of Muri, Aargau, Switzerland, and Professor Loewy of Berlin. The agents for Chologen are Charles Yarrow and Co., 36, Basinghall Street, London.

The treatment is most simple as the whole course consists in the administration of the following in tablet form:—

Chloride of mercury (0.005 gramme) and podophyllin (0.005 gramme), *no.* 1 *tablet.* Chloride of mercury, *no.* 2 *tablet.* Podophyllin, chloride of mercury, camphor (0.0025 gramme), and menthol (0.0025 gramme), *no.* 3 *tablet.*

Treatment.

For ten days 1 to 2 tablets "no. 1" morning and noon. For forty days 1 to 2 tablets "no. 1" morning and noon, and evening two tablets "no. 2."

For ten days one tablet "no. 3," morning, noon, and evening. When an attack threatens three "no. 2" tablets should be taken.

During this treatment the following rules for diet are recommended:—"Good nourishment, with mixed diet (not merely milk and soups), moderate meals, and thorough mastication are essential. Abundant and hasty meals, very rich or highly seasoned food, raw fruit, salmon, lobster, beans, cream, beef-tea, beer, heavy or acid wines, strong coffee, and heavy smoking are to be avoided."

I may be entirely wrong in supposing that this treatment is not common in India, or in suggesting that it is hardly known. However, as it has helped me out of

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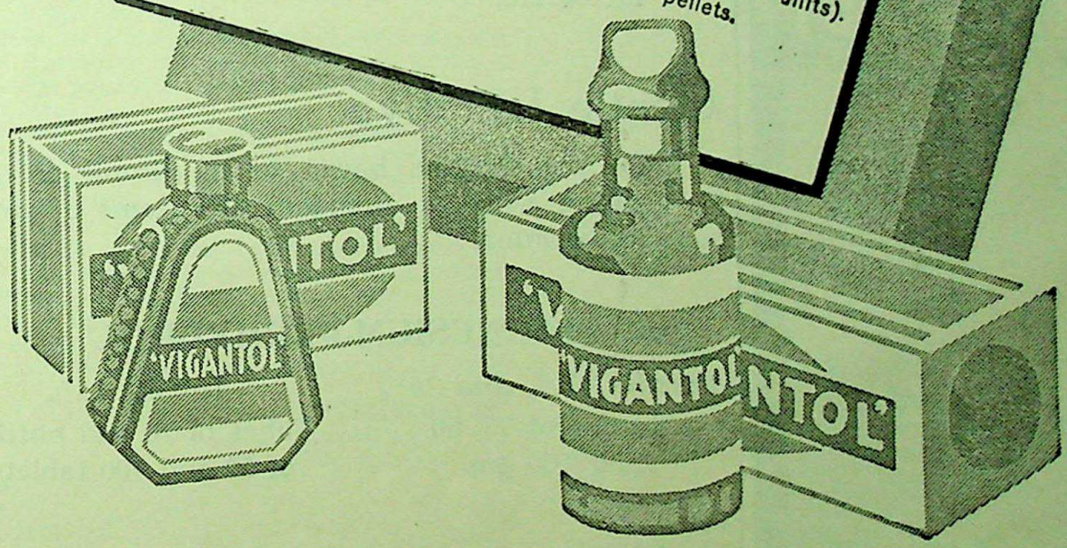

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at least one difficult situation (when a patient would not be operated upon) and as I cannot lay my hands on any general reference to this subject in the ordinary medical books, I thought that others might like to benefit by my good fortune in coming across a treatment which is both simple and, as far as I can see, extremely good. Study of the pamphlet mentioned above will give all the contra-indications for this line of treatment.

Please do not think I have any financial interest in the matter; I know nothing about either the agents from whom Chologen is procured in England or the manufacturers on the Continent; as the pamphlet shows there is no mystery in the drug's composition.—Yours, etc.,

C. S. P. HAMILTON, D.S.O., M.R.C.S., L.R.C.P., MAJOR, R.A.M.C. (Retd.).

KAPNAPAHAR TEA ESTATE,
JURI P. O. AND T. O.,
SOUTH SYLHET, ASSAM,
8th July, 1931.

NOTES ON THE DIAGNOSIS AND TREATMENT OF ULCUS TROPICUM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I was interested to read Dr. Flora R. Innes' article on the treatment of ulcus tropicum in your August number. This condition is fairly common in Assam, where it is known as Naga sore.

Hitherto we had been using plain eusol dressings, with results that on the whole were satisfactory.

Experimentally, we adopted the treatment described by Dr. Innes, the results were certainly very striking. The sores, far from improving, obstinately refused to show the least change. In one case a boy had two sores, about equal in size, one on each tibia; one we treated with eusol, the other with the bicarbonate-cinchona dressing. After three weeks, the former had filled in and presented healthy granulations, which would heal within a week or ten days, the latter remained, as it was, a foul, indurated ulcer with copious sero-purulent discharge. The cinchona dressing certainly relieved the pain, but that was all.

Local differences in temperament may perhaps account for the fact that whilst in its early stages the condition is undoubtedly painful, later it seems to affect the patient but little.

Certainly none of our cases shed tears when the daily dressing is performed, and it would take more than a trifle like a Naga sore to keep them from sleeping at any hour of the day.

I would not for a moment doubt the admirable results obtained by Dr. Innes, but I suggest that ulcus tropicum is far from being a single clinical entity. Such differences in therapeutic response point to wide differences in ætiology.

In view of the disabling nature of the disorder and its wide distribution, the point is one of no little interest.

G. H. FITZGERALD,
CAPTAIN, I.M.S.,
Civil Surgeon.

KAMRUP,
ASSAM,
September, 1931.

COCOANUT MILK AS AN ANTHELMINTIC.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—You were good enough to print a letter from me some time back requesting further trial of, or the results of those who had tried, the anthelmintic action of the juice of the tender cocoanut.

Since writing that letter I have come home so have not myself tried it out any further, but on talking the matter over with a pharmaceutical chemist we looked up the item in "*The Extra Pharmacopœia*," Martindale and Westcott, 19th edition (page 91), to read this note under cocoanut oil. "The endocarp or meat of the nut is said to be a powerful taenicide. The patient should drink the milk and then eat the flesh of the nut (U. S. D.)."

And according to the references U. S. D. stands for the United States Dispensary and probably is also a work embodying the latest additions to this pharmacopœia.

May I therefore again ask through your valuable columns if there is any virtue in the endocarp and milk of the tender cocoanut, or how best it could be tried out to find an answer?—Yours, etc.,

H. BAYLISS-STOKES.

C/o MESSRS. GRINDLAY & CO.,
54, PARLIAMENT STREET,
LONDON, S.W. 1,
8th August, 1931.

VACCINATION AND WHOOPING COUGH.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the *Medical Annual* for 1931 it is stated that the paroxyms of whooping cough can be arrested by vaccination against small-pox, but since this method of treatment was recommended in the early part of the present century, it cannot be claimed as something new, but only as something forgotten and revived.

Vaccination was recommended as a method of treatment in whooping cough under the impression that it produced a leucocytosis, and was by that means beneficial. There was then no familiar means of producing an artificial leucocytosis, and blood counts were done only by a few experts; hence the idea was but a conjecture. No virtue was attached to the vaccine.

In 1907, when I was stationed at Ghagiabad on the East Indian Railway, I had a patient—the young daughter of a European employé—who had a cough, with a good deal of general physical disturbance and a distinct "whoop." I suggested vaccination as being most likely to cut short the course of the disease, but I need hardly say that the suggestion was at first received with scepticism and ridicule. However, by persisting and pointing out that no possible harm could follow, I was permitted to vaccinate the young lady. By the following morning the effect was so marked that it seemed incredible to the relatives that the vaccination was really the cause of the improvement. The patient had a good night, her temperature was down, and there were no more "whoops" nor distressing bouts or coughing. The patient made a rapid recovery, and there was no return of the cough.

This was the only case of whooping cough on which I tried this method. The patient had been previously vaccinated, so my operation was a secondary one.

Perhaps small-pox vaccine is to whooping cough what the malarial toxin is to general paralysis of the insane, for when this treatment was first introduced, the malaria was believed to benefit by the high temperature produced sterilizing the system of the causative organism; but opinion is now in favour of the belief that the malarial toxin has some specific effect in syphilis.

My object in drawing attention to the vaccination method of treating whooping cough is that those who may have the opportunity, such as medical officers of hospitals, may try it and prove its utility.

Will an artificially produced leucocytosis—however brought about—cut short the disease? Or is it the small-pox vaccine that has a specific effect?—Yours, etc.,

J. E. L. CHINAL, M.D., D.T.M., L.M.

MONGHYR,
E. I. RY.,
21st September, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

LIEUTENANT-COLONEL J. D. SANDES, officiating Professor of Medicine, Medical College, and First

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Physician, College Hospitals, Calcutta, is appointed to act as Principal, Medical College, Calcutta, in addition to his own duties, *vice* Lieutenant-Colonel D. P. Goil, for the period from the 28th September to the 14th October, 1931.

Major J. C. De, officiating Professor of Clinical Medicine, Medical College, and Second Physician, College Hospitals, Calcutta, is appointed to act as Superintendent of the Medical College Hospitals, Calcutta, in addition to his own duties, *vice* Lieutenant-Colonel D. P. Goil, for the period from the 28th September to the 14th October, 1931.

Major H. E. Murray, on relief from his duties as officiating Surgeon-Superintendent, Presidency General Hospital, Calcutta, is appointed as Civil Surgeon, Bakarganj, *vice* Major T. H. Thomas.

The undermentioned officers have been appointed to the Indian Medical Service as Lieutenants on probation, with effect from the dates noted against their names:—

Edward Henry Lossing, 4th August, 1931, with seniority from 4th August, 1930.

George Wesley Miller, 4th August, 1931, with seniority from 4th August, 1930.

Desmond George McCaully, 4th August, 1931.

Henry Joseph Roberts Thorne, 4th August, 1931.

The seniority of Captain B. P. Baliga (provl.), (on probn.), has been antedated to the 17th June, 1922.

LEAVE.

Lieutenant-Colonel D. P. Goil, Principal, Medical College, and Superintendent, Medical College Hospitals, Calcutta, is allowed leave for the period from the 28th September to the 14th October, 1931.

Major T. H. Thomas, Civil Surgeon, Bakarganj, is provisionally granted leave for 7 months, with effect from the 12th September, 1931.

PROMOTIONS.

The promotion of Major F. Phelan to the rank of Major has been antedated to the 25th July, 1924.

The promotion of the undermentioned officers to the rank of Major has been antedated to the dates noted against their names:—

Major M. S. Joshi, 23rd November, 1926.

Major J. L. D. Yule, 7th April, 1927.

RETIREMENT.

Lieutenant-Colonel C. J. Stocker, M.C., has retired from the service, with effect from the 14th August, 1931.

Notes.

DOWN BROS., LTD.

MESSRS. DOWN BROS., LTD., the well-known manufacturers of surgical instruments and aseptic hospital furniture, have brought to our notice the fact that they have recently transferred their Calcutta office and showroom to more commodious premises. The new premises remain at Grosvenor House, 21, Old Court House Street, but are now located on the first floor, and Messrs. Down Bros. have there on view an interesting range of surgical instruments, many of which are of recent introduction, as well as a display of operating-theatre equipment and sterilization apparatus.

TETRA-IODO-PHENOLPHTHALEIN B. D. H.

FOR USE IN CHOLECYSTOGRAPHY.

THE practice of cholecystography owes its origin to several American workers who observed that when the halogen derivatives of phenolphthalein were administered intravenously excretion was effected by means of the biliary passages. Of these halogen derivatives the tetra-iodo compound proved the most satisfactory. Later experiments showed that the simpler method of oral administration produced equally good results in practically all cases.

Tetra-iodo-phenolphthalein, which is issued for the sake of convenience in the form of its sodium salt, is manufactured in the B. D. H. laboratories. Every batch is tested for toxicity on animals before issue.

T. I. P. (Tetra-iodo-phenolphthalein) meal.—The T. I. P. meal issued by the British Drug Houses is a convenient preparation for the oral administration of tetra-iodo-phenolphthalein. It is made specially for the ready production of a liquid meal for use in cholecystography. The whole of the contents of a bottle of T. I. P. meal is added to half a small tumblerful of cold water, stirred for about thirty seconds, until a white milky suspension is formed, and then taken as a single draught. The contents of each bottle represent a dose of 3.5 grammes of the physiologically-tested sodium salt of tetra-iodo-phenolphthalein, this being the recognized dose for an adult weighing not less than 120 pounds. For persons weighing less than 120 pounds, the dose may be proportionately reduced.

General technique.—The last meal of the day should be a light one, and it should contain no fat. It should be taken at about 5 p.m., and one hour later the T. I. P. meal should be administered. The fast should not be broken until after the exposure of the first *x*-ray plate between 9 a.m. and 10 a.m. on the following day; a meal containing fat should then be given. A second plate should be exposed between 1 p.m. and 2 p.m.

T. I. P. meal is issued only in bottles which contain the equivalent of 3.5 grammes of the pure physiologically-tested sodium salt of tetra-iodo-phenolphthalein; it can be obtained from The British Drug Houses, Ltd., London, N.1.

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Original Articles.

PSYCHOLOGICAL ASPECTS OF OPIUM ADDICTION.

By R. N. CHOPRA, M.A., M.D. (Cantab.),
LIEUTENANT-COLONEL, I.M.S.,
and
J. P. BOSE, M.B. (Cal.), F.C.S. (Lond.).
(*Calcutta School of Tropical Medicine and Hygiene. Drug Addiction Inquiry I. R. F. A.*, Series No. 14.)

OPIUM is one of the most useful drugs we possess. Professor Macht, writing about opium, said "If the entire materia medica at our disposal were limited to the choice and use of only one drug, I am sure that a great many, if not the majority of us, would choose opium; and I am convinced that if we were to select, say half a dozen of the most important drugs of the pharmacopœia, we shall place opium in the first place". Opiates are used to relieve pain and distress, to induce sleep, to allay cough, to lessen dyspnœa, to check excessive peristalsis, to suppress convulsions, to facilitate anæsthesia, to promote diaphoresis, to control vomiting, and to favour arrest of hæmorrhage. They are the most efficient of all the analgesics we have. In relieving severe pain due to such gross lesions as malignant growths, acute inflammation of serous membranes, fractures, the painful crises of locomotor ataxia, various forms of colic (renal, biliary and intestinal), they have no rival. It is surprising that in spite of the rapid advance in synthetic chemistry of medicaments and the production of a large number of somnifacients or hypnotics, there is not one drug which relieves insomnia from any cause, especially that produced by pain, so effectively as the opiates.

The great disadvantage of these drugs, however, is that they are very liable to lead to the formation of a habit. The morphine habit is frequently met with in the West, and in this country the opium habit has often been acquired by injudicious use of these drugs for relief of pain or insomnia. The physician himself is frequently responsible for many such cases. Though neurotic individuals are said to be more susceptible to the formation of the habit, there is no doubt that apparently normal persons also have fallen a prey to the temptation of indefinitely repeating the use of these drugs. According to Hubbard, the very susceptible acquire the habit of taking such drugs as opiates or cocaine in a very short period of time, some say as short as ten days. A few sniffs of cocaine taken by some girls have been said to have produced withdrawal symptoms, showing that addiction has been established. Usually, however, many more indulgences are required. It is thought by many authorities that any one taking these drugs repeatedly for a period of three to five weeks is in very grave danger of becoming an addict. When given by injection the habit formation is said to be more quickly attained than when the drugs are taken by the mouth. The formation of the habit, especially in case of opiates, leads to increase of dosage. This is due to the fact that tolerance to these drugs is very rapidly established; in a very short time an individual can stand larger doses, and in order to produce the usual effects, he requires them. This may go on till many times the minimum lethal dose can be taken without harm. The ill effects following on the production of the habit with morphine have been fully discussed in the literature and so far as opium is concerned have been dealt with by the senior author elsewhere. When the habit is established the person becomes an addict. This is shown by the fact that if the habitué does not get his usual dose he develops a series of most distressing symptoms known as *abstinence* or *withdrawal symptoms*. The patient has an anxious expression, is unable to carry on ordinary conversation, and complains that he is undergoing unbearable torture. Other symptoms commonly met with are extreme restlessness, quick breathing, an unusual and indescribable uneasiness, a feeling of intolerable distress especially in the epigastrium and lower extremities, an irksome sense of incapacity both for intellectual work and for mental or emotional enjoyment, constituting together a state of exquisite misery, pain in the abdomen, and insomnia. The only relief from these is obtained by a renewed course to the stimulus by a fresh dose of opium, which makes the addict happy again and capable of exertion almost immediately. Thus, there is an intense craving for the drug. That most of these symptoms are psychic in origin is shown by the fact that they appear with a dramatic suddenness and a dose of opium affords relief with almost equal promptitude, the symptoms disappearing within a few minutes after the drug is taken. Such symptoms as severe and obstinate diarrhœa, rapid and later weak and irregular pulse, periods of tachycardia alternating with bradycardia, cold sweats, mania, exhaustion, collapse and rarely death, described as *abstinence* symptoms, occurring in morphine addicts of long standing taking very large doses of the drug, rarely occur in our experience in this country, even among those individuals addicted to very large doses of opium.

A perusal of what has been said above will show why medical men are afraid of making use of opiates in the relief of pain and insomnia. Even in those patients where there are strong indications these drugs are often withheld for fear of setting up addiction. While engaged in the study of the opium habit in India, it occurred to the senior author to see how far there was danger of producing the opium habit by the therapeutic use of large and small quantities of this drug. Many cases are on record where opium given to patients

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with their knowledge, for relieving pain or other conditions has led to addiction. The withdrawal of the drug in such patients produced marked abstinence symptoms which often could not be overcome, and the habit continued. On the other hand we have come across many cases where persons taking one hundred grains or more of opium daily, when they are sent to a jail to undergo a sentence, forego their daily dose with little discomfort. During the War, in the East African campaign the senior author was in medical charge of a Sikh company of Sappers and Miners from one of the Punjab States. Practically all the Indian officers and men of this unit were very heavily addicted to opium, many taking over 100 grains daily, some as much as 200 grains or more a day. This unit in the beginning brought a certain supply of opium, but this was soon exhausted and as no local supply was available, they had to fall back on the commissariat supply of 5 to 6 grains daily. These men were watched during this period, but in no case were there signs of any acute distress. There were many similar instances in the Indian Army during the War. It has also been our experience in treatment of opium addicts that the drug can be considerably reduced or entirely omitted by substitution of such substances as gentian or nux-vomica preparations in pill form. No abstention symptoms develop in these patients.

All these facts strongly point to a very predominant psychic element in addiction, and in the so-called abstinence symptoms. Even in severe cases of morphine addiction many of the mental symptoms, such as agitation, anxiety, persecutory ideas, psycho-sensory disorders, mania, even hysteriform or epileptiform attacks, present all the features of acute psychosis.

To confirm these views by a more systematic study we decided to administer opium to a series of patients in the Carmichael Hospital for Tropical Diseases, so concealed that the patients remained absolutely ignorant of its identity. For this purpose opium was administered in form of a mixture so constituted that one ounce contained 1 to 2 grains or more of the drug. The taste and smell of opium were effectively concealed by adding oil of citronella. The mixture was given a number and even the hospital staff did not know that it contained opium. The initial dose given was 1 to 2 grains a day and this was gradually increased till in a short time as much as 15 to 16 grains could be administered daily without producing any untoward effects. The drug was continued for varying periods and then it was suddenly stopped, the idea being that if the patient showed any abstinence or withdrawal symptoms he had become addicted to the drug. For the last three years this mixture has been tried in a number of cases and the results are summarised in the following table:—

TABLE I.

1	2	3	4	5	6	7	8	9
No.	Name.	Age.	Disease.	Daily dose to start with, in grains.	Maximum daily dose achieved, in grains.	Duration, in days.	Withdrawal symptoms.	REMARKS.
1	S. P.	52	Diabetes	2	8	41	Nil	
2	K. M.	32	Nephritis	1	9	36	Nil	There was a gap of 7 days in the course owing to the drug not being in stock.
3	C. K.	35	Diabetes	2	12	27	Nil	
4	K. M.	23	Ascites	1	8	25	Nil	
5	C. L.	27	Nephritis	2	8	25	Nil	
6	A. A. M.	21	Psoriasis	1	7½	24	Nil	
7	S. S.	40	Diabetes	1	8	23	Nil	
8	S. P.	35	Diabetes	1	4	23	Nil	
9	N. D.	40	Dysentery	2	16	23	Nil	Headache and giddiness, disappeared on increasing the dose.
10	R. S.	35	Diabetes	1	6	22	Nil	
11	L.	2½	Nephritis	½	1¼	20	Nil	
12	J. S.	27	Hookworm	1	6	18	Nil	
13	A. K. G.	28	Malaria	2	12	17	Nil	
14	M.	12	Nephritis	½	1	16	Nil	
15	B. M.	30	Mitral stenosis.	1	7	16	Nil	
16	A. A. M.	30	Diabetes	1	2	16	Nil	
17	P. K. B.	24	Malaria	2	5	49	Nil	
18	S. C. K.	48	Diabetes	1	5	13	Nil	
19	S. F.	45	Diabetes	2	3	13	Nil	
20	G. D.	35	Gastritis	1	4	12	Nil	

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A perusal of table I will show that after commencing with 1 to 2 grains of opium daily the dose was gradually increased. Vertical column 6 of the table shows that in case 9 the maximum dose of 16 grains daily was achieved, in cases 3 and 13 twelve grains daily, in case 2 nine grains daily, in cases 4, 5 and 7 eight grains daily. The maximum doses were continued for varying periods and then the drug was suddenly stopped. Vertical column 7 shows that in case 1 the drug was continued for nearly 6 weeks, in case 2 for over 5 weeks and in many cases for over 3 weeks. In the majority of patients, therefore, the period for which the drug was given was sufficient to produce addiction.

While the drug was being administered the only symptom commonly observed was constipation and in some patients slight headache. Many of the patients showed a great desire to sleep. Practically all of them said they felt comfortable and believed that the medicine was doing them a lot of good. Any symptoms such as pain, abdominal trouble, etc., were relieved by the drug. There was no doubt whatsoever that the therapeutic effects of opium were obtained though the patient was unaware that he was taking this drug.

We used this mixture in cases in which there was a suspicion that the patient was shamming pain or other such symptoms. Malingerers always said they were not relieved, whereas those with genuine symptoms admitted relief after one or two doses. In the series described in the table where the drug was suddenly stopped, in no case did we observe even a suspicion of the withdrawal symptoms usually met with in the addicts. Sometimes a patient would remark that the last mixture was doing him a lot of good, but even the mild abstinence symptoms, such as restlessness or craving for the drug, were never observed.

Our colleague, Lieut.-Col. H. W. Acton, has also independently confirmed our findings on his own patients in the Carmichael Hospital for Tropical Diseases. In one patient suffering from a large painful granuloma covering the pubis and both groins, this mixture was tried for nearly three months and then suddenly stopped. This patient did not show any signs of addiction or abstinence symptoms, and expressed no particular desire for the mixture. In another case of a chronic and painful constitutional disease, pantopan was continued for over six months, and when the patient improved and it was stopped no signs of addiction were discernible. The patient asked for the drugs nearly three months later when the pains recurred. He also confirmed the value of the mixture in differentiating malingering from genuine symptoms.

Discussion.

A large volume of clinical as well as experimental work has been done during the last 30 years to find the cause of the withdrawal or abstention symptoms. According to some the increased tolerance is associated with, and partly dependent on, the increased power of the body to oxidise morphine into an inert substance. That this is not the whole explanation is shown by the fact that immunised rats may contain in their bodies at one time more than enough morphine to kill normal animals and yet they will show no signs of intoxication. It has been shown in dogs who were given morphine daily that certain functions become accustomed to the drug long before others. Thus the vagal centre, the respiratory centre and the pupils are readily made resistant to large doses, while the digestive system is still sensitive to small doses. These experiments show that the cells become resistant to morphine action and that the habituation is not entirely a generalised process. Other workers have favoured the idea of the formation of an anti-serum comparable to a bacterial anti-toxin. This has been denied by others. According to yet another theory the cause of withdrawal and abstention symptoms is the formation of a toxin in the body which exerts an opposite effect, thus making larger and larger doses of the drug necessary to overcome it. When the drug is withheld the symptoms produced are due to the effect of the toxin.

The experimental data accumulated show that while there is evidence of peripheral somatic and psychic changes, no satisfactory explanation can be given of the exact nature of the phenomena observed in the drug habit, either in man or in experimental animals. That the psychological factor plays an important part in the development of addiction abstention symptoms, in the case of opium at any rate, is clear from our investigations. With the exception of obstinate diarrhœa, other symptoms showing somatic and nervous changes, *e.g.*, acceleration and weakening of pulse and rhythmic changes in the heart beat, acute homicidal and suicidal mania, severe collapse, death, etc., although they may occur with large doses of morphine by injection or otherwise, are rarely met with in our experience even with the very large doses of opium taken in this country.

Summary and Conclusions.

While it is not the object of this paper to give an explanation of the phenomena of tolerance and abstinence symptoms met with after the habitual use of opiates, our experience so far as the opium habit in India is concerned is that in the *withdrawal* or *abstinence symptoms* there is a predominant psychic element which can be overcome if the circumstances demand it. This is amply shown by experience of convicts in jail, and men under war conditions habituated to large doses of the drug for years who have to give it up suddenly and yet suffered no marked discomfort or withdrawal

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symptoms. During the treatment of addicts to rid them of the opium habit, opium can be largely or totally replaced by substances such as gentian or nux-vomica preparations in pill form. The series of cases we have given shows that if the patient is not aware that he is taking opium, the drug can be effectively given for weeks or months for its therapeutic effect, and can be stopped at any moment without producing abstinence symptoms. Physicians, therefore, need not hesitate to use opiates in special cases where these are indicated, provided they conceal the identity of the drug from the patient. We now regularly use opiates in this manner in the treatment of asthma, amœbiasis, or any other condition in which they are likely to benefit the patient. Opiates given in this manner can also be effectively used to detect malingering.

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INDIAN SQUILLS.

By R. N. CHOPRA, M.A., M.D. (Cantab.),
LIEUTENANT-COLONEL, I.M.S.,
P. DE, B.SC., M.B. (Cal.), M.R.C.P. (Edin.),
and
B. MUKHERJEE, M.B.
(*From the Department of Pharmacology, Calcutta School of Tropical Medicine and Hygiene.*)

(*Indigenous Drugs I. R. F. A., Series No.* 26.)

A GREAT deal of attention has lately been paid to the expectorant, cardiac-stimulant and diuretic properties of Scilla. Although a useful and potent drug, on account of its irritable effects on the gastro-intestinal tract it has not been possible to use it to any large extent in therapeutics as a cardiac tonic. Efforts have therefore been made of late years to isolate its active principles and to see if it is possible to separate these from the irritating substances contained in the bulbs. Two substances have been isolated, an apparently pure crystalline glucoside named scillaren A, and an amorphous complex constituent, probably a mixture of two glucosides, which has been given the name of scillaren B. The latter substance is easily soluble in water while the former is practically insoluble. Both experimental and clinical experience with the drug has shown that the action of scillaren closely resembles strophanthin, and it was also said that like the latter substance it suffers from the disadvantage that it cannot be given by the mouth. De (1927) showed that scillaren exerts a digitalis-like action on the heart, that its irritant action on the alimentary canal is slight, and that it is absorbed from the alimentary tract. Stehle, Ross and Dreyer (1931) have shown that scillaren B produces a rise of blood pressure due to its vaso-constrictor action in animals, that the amplitude of ventricular beats is increased and that the cardiac output is improved. In view of the more extended use of squills as a cardiac tonic in the light of this research, we analysed our records of biological assay to see how the Indian squills stood with regard to their pharmacological activity.

As is well known the bulbs of *Urginea scilla* are official in the British Pharmacopœia and *Urginea maritima* in the United States Pharmacopœia. Both these varieties grow on the shores of the Mediterranean and are used largely in medicine. The bulbs, and also the preparations made from them, were, and are still, imported into India from countries bordering on the Mediterranean, and a high price has to be paid for them. In India, two varieties of squill grow abundantly which have got properties almost identical with the official *S. maritima*. *Scilla indica* Roxb., known as *Suphadie-khus* in Bengali, *Bhuikanda* or *Paharikanda* in Bombay and *Shiru-nari-vengayam* in Tamil, grows frequently in sandy places, especially near the sea, in the Deccan peninsula, from the Konkan and Nagpur southwards. *S. Hohenackeri* Fisch et Mey is a closely allied species met with in the Punjab. The bulbs are whitish brown in colour, scaly, about the size of a nutmeg, composed of very smooth and fleshy scales, which are so imbricated that they may be mistaken for coats if not carefully examined. They are roundish and ovate in shape, sometimes slightly compressed on the sides. *Urginea indica* Kunth is known as *Kanda*, and *Jangli-piyaz*, in Hindustani and Bengali, *Jangli-kanda* in Gujrati, and *Nari-vengayam* in Tamil. It is found in sandy soil, especially near the sea, throughout India. It also grows in the drier hills of the lower Himalayas and on the Salt Range in the Punjab and North-West Frontier Province at an altitude of 2,000 feet. The bulbs are about the size of a lime and are tunicated. The outer coats are inert.

The squill sold in the Indian bazars is a mixture of these two varieties. The bulbs are usually sold whole in an unsliced state in ordinary druggists' shops, but of late sliced squills are also being supplied to the large manufacturers from Chittagong, Bombay and Jaunpur (United Provinces). The two varieties have the same action and can be distinguished by the fact that Urginea bulbs are tunicated, while the Scilla bulbs are imbricated. The bulbs, though smaller than the imported variety, are equally nauseant and bitter. In preparing squills for the market particular attention has to be paid to proper drying of the sliced bulbs, otherwise they may get mouldy in the course of transport and may lose their activity.

For many years the Indian varieties have been used as a substitute for the official varieties by the Government Medical Store Depot in Bombay for manufacture of galenicals, and the results, obtained clinically, have been quite

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satisfactory. The Indian variety was even made official in the British Pharmacopœia in 1914. *U. indica* is said to be cheaper than *U. maritima*, and, if its cultivation and method of harvesting are improved and it is grown on a large scale, it will successfully compete with the Mediterranean variety in the European market. Some of the drug manufacturers in Calcutta are using the combined bulbs of *S. indica* and *U. indica* obtained from the Chittagong hill tracts for the preparation of tinctures, etc., and a large trade in this drug has developed in that district. In the following table we have summarized our results of the biological assay of tinctures of Scilla made from the imported and Indian varieties. The assays were carried out by Chopra and De's (1926) modification of Hatcher's cat method and gave a good reduction in heart beat.

TABLE.

	Number of samples assayed.	Up to B. P. standard.	Below B.P. standard.	Stronger than B. P. standard.
U. indica and *S. indica* from Chittagong.	73	64 (87.6%)	8 (10.96%)	1 (1.44%)
U. scilla from the Mediterranean coast. (Imported.)	28	19 (67.9%)	3 (10.7%)	6 (21.4%)

A perusal of the above table will show that the Indian squills are in no way inferior to the imported varieties of *U. scilla* and *U. maritima*.

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CARBON TETRACHLORIDE IN THE TREATMENT OF TÆNIA INFECTIONS.

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and

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ALTHOUGH male fern in one or other of its forms is undoubtedly valuable for removing tapeworms from human beings, it has been found relatively inefficient for this purpose in the Calcutta School of Tropical Medicine, where it was used for a considerable period. We accordingly felt the necessity of finding something more reliable.

On searching the literature we found that Allan (1912) reported the cure of three cases of *Tænia saginata* infection with a dose of thymol given "in the usual way". Artault (1913) claimed to have cured twenty-three cases with thymol by giving twenty-five centigrammes every morning for eight days. It was stated that the worm was usually passed on the third or fourth day, but to make absolutely certain of cure the treatment was continued for eight days. The same treatment and dosage was used by Arnozan (1919), but he only continued it for six days, and he reported sixty successful cases. These very favourable reports led us to give the above method a trial, and we treated two cases, giving a powder consisting of four grains each of thymol and lactose every morning for eight days. The reason for using lactose with thymol was that Washburn (1917) found the action of thymol against hookworms was greatly increased when it was mixed with lactose, and it would be expected to have the same result in the case of tapeworms. During the course of treatment both patients occasionally passed a few segments of worms, in the same way that untreated cases normally do, indicating that the thymol was having apparently no effect on the parasites. We therefore did not consider it worth while pursuing this line of treatment further.

Tomb (1923) reported a case in which four treatments with male fern had been unsuccessful, the patient finally being cured by fifteen grains of betanaphthol every morning for ten days with a cup of tea and no food until lunch time, and he added that others have also reported success with this method. We treated two cases following Tomb's directions exactly, and as the results were no better than with thymol this method was also abandoned.

One paper by Daubney and Carman (1928) and another by Carman (1929) reported very great success in the removal of tapeworms with carbon tetrachloride, so we next tried this drug.

It was thought that preliminary clearing out of the intestine would probably enhance the action of the drug, as it is said to do so in the case of male fern. Therefore when patients were admitted to hospital they were put on Bovril drinks as their sole diet, and were given a saline purge on the two days prior to treatment. We also thought it possible that, the patients being practically starved for two days, the glycogen stored in the liver might be considerably reduced, and the toxic action of carbon tetrachloride on this organ might be accentuated accordingly. To counteract this we gave several ounces of sugar syrup during the two days of preparation, with the idea of stocking the liver with glycogen and so protecting it. Carbon tetrachloride was administered on the morning of the third day, and it was followed by a saline purgative one and a

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half to two hours afterwards. The dose of carbon tetrachloride employed was three cubic centimetres for an adult with appropriate reduction for children; the actual dose given to each patient is shown in the table in minims. Nine cases were treated in this way with six cures, *i.e.*, 66.6 per cent. Although these figures were encouraging we thought we might get even better results if the carbon tetrachloride were given in capsules soluble in the duodenum. We treated three patients in this way, making no difference in the above method except that the carbon tetrachloride was given in soft gelatine capsules instead of being shaken up in water. The first of these patients passed only a few segments after treatment, the second passed no segments for five days after treatment, and the third passed almost the whole worm, and from the subsequent history appears to have been cured. It seems clear from these three cases that giving carbon tetrachloride in capsules does not improve its action, but if anything rather lessens its efficiency; accordingly no more cases were treated in this way.

Up to this time no toxic symptoms whatever had been exhibited by any of the patients so it was decided to discontinue the sugar syrup, and, because the simpler a treatment is made the better it is for all concerned, it was decided to stop the preliminary starvation and purgation as well. The next thirteen cases were admitted to hospital and on the evening of the day of admission they had a meal consisting of milk and bread only, and first thing the next morning they were given their dose of carbon tetrachloride shaken up in the saline purge; thus by this procedure of giving the anthelmintic and purge at the same time the treatment was further simplified. Eleven out of these thirteen cases were cured—this gives a percentage of 84.6—and the two remaining cases were known to be uncured. If the twelve cases who had preliminary treatment are taken together it is found that seven (or 56.6 per cent.) were cured, two were not cured, and three were lost sight of. Although the numbers are small it seems evident that the best results are obtained without preliminary treatment. Daubney and Carman also found that a preliminary purge was not an advantage, for they treated a series of twelve prisoners with a dose of castor oil the night before they gave carbon tetrachloride, and eleven of them who remained in gaol long enough to have their stools examined a second time were all found to be still infected.

Our total figures since beginning the use of carbon tetrachloride are twenty-five cases with eighteen (or 72 per cent.) cures, four failures to cure, and three cases lost sight of. Carman and Daubney treated twenty-four cases, mainly with multiple infections, with 31.8 per cent. of cures using carbon tetrachloride alone, and fifty-eight cases with 69.5 per cent. of cures using carbon tetrachloride and oil of chenopodium together. From these figures they conclude that the two drugs combined are better than carbon tetrachloride alone. We obtained 72 per cent. of cures using carbon tetrachloride alone and in smaller doses than the above workers used, and when we omit the cases that had preliminary treatment we get 84.6 per cent. of cures. It therefore seems that if oil of chenopodium assists at all its effect is not so great as Daubney and Carman think. It is true that almost all our cases are infections with a single worm, and that Daubney and Carman in a series of thirty boys in a reformatory cured 97 per cent. of what they describe as light infections, and they used, as far as can be gathered, carbon tetrachloride without oil of chenopodium. Although their cure rate is somewhat higher than ours it supports the contention that oil of chenopodium does not appear greatly to increase the number of cures. It appears rather optimistic to look on 97 per cent. as the proved cure rate in light infections of *T. saginata* when the result is based on a single series of thirty cases. Taking into consideration all Daubney and Carman's figures in conjunction with our own, it seems probable that when more records are available they will show that between 70 per cent. and 80 per cent. of cases of *T. saginata* infection will be cured by a single dose of carbon tetrachloride, irrespective of whether the infection is single or multiple.

The failure to find scolices does not mean that a patient has not been cured. The most striking figures illustrating this point are those of the thirty reformatory boys treated by Daubney and Carman, for after the treatment they only found two scolices, but seven weeks later only one of the thirty was again passing tapeworm segments; of the eighteen cases cured by us scolices were recovered in only eight. The reason given by the above authors for the small number of scolices found after treatment with carbon tetrachloride is that the drug kills the worms and so renders them susceptible to digestion. We agree with this interpretation, and the following case illustrates how rapidly digestion of the scolex may occur. A patient was treated at six a.m., and the stool was received in our laboratory at eleven a.m., it was washed immediately and the scolex broken off short from the strobila was found. This was placed on a slide in water and a cover-glass lightly dropped on top of it without any pressure, and it was found that the manipulation had caused the suckers to fall away from the head beside which they were lying, and that the head itself was so softened that it was quite distorted and ragged looking, and if it had not been for the adjacent suckers with the cavities in the head from which they had fallen away being visible the structure would have been unrecognizable as a cestode scolex.

Unfortunately during the time male fern was in use the patients were not followed up and

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RESULTS OF TREATMENT WITH MALE FERN AND CARBON TETRACHLORIDE.

	Male fern.	Carbon tetrachloride.
Number of cases ..	34	25
Number from which scolices were recovered.	5	8
Number traced and found cured.	0	10
Number not traced ..	21	3
Number not cured ..	8	4

asked to report if they had a recurrence of passing tapeworm segments, so that we do not know how many of the above twenty-one were cured, whereas in the case of the carbon tetrachloride series there are only three about which we know nothing. It is extremely unlikely that all the unknown cases were cured, but if we accept this possibility we find 76 per cent. of cures with male fern and 84 per cent. of cures with carbon tetrachloride. This estimate obviously greatly favours the cure rate of male fern with its much greater number of unknowns, and even then the cure rate of carbon tetrachloride is better by 8 per cent. We therefore feel justified in stating that in our experience carbon tetrachloride is a much more efficient agent against *T. saginata* than male fern.

Male fern is still practically the universal remedy against tapeworms in human beings, and although the records of its successful employment in this connection are very numerous in the literature, most of the reports refer to treatment of one or two cases with no reference to failures, so it is impossible to obtain figures of the cure rate with this drug when a large number of cases have been treated with it under similar conditions. Schneider (1926) who strongly advocates the use of a duodenal tube in the treatment of tapeworm infections, as he says the drug is more efficient and can be given in smaller doses by this method, only cured 71.2 per cent. of eighty-seven cases. This implies that given in the ordinary way male fern cures less than the above percentage. Our cure rate at its lowest estimate is 72 per cent. and that of Daubney and Carman varies between 69.5 per cent. and 97 per cent. for different series of cases, so there seems little

Cases treated with carbon tetrachloride.

No.	Age in years.	Preliminary treatment.	Dose in minims.	Purgative.	Amount of worm passed.	After-history.
1	15	Bovril, sugar, purgative for 2 days before.	20	1½ hours later.	About half strobila ..	Not known.
2	3	Do.	10	Do.	Whole worm ..	....
3	14	Do.	32	Do.	Almost whole worm ..	Free up to one year.
4	14	Do.	32	Do.	Whole worm ..	....
5	30	Do.	48	2 hours later.	Whole worm ..	....
6	16	Do.	48	Do.	Whole worm ..	....
7	15	Do.	40	Do.	Part of strobila only ..	Not cured.
8	48	Do.	48	Do.	Part of strobila only ..	Not known.
9	16	Do.	48	Do.	Part of strobila only ..	Free up to 2 months.
10	37	Do.	32 in capsule (in 2 portions).	1½ hours later.	Large strobila. Stool not washed.	Not known.
11	14	Do.	32 in capsule	Do.	No segments passed for 5 days after treatment.	Not cured.
12	15	Do.	48 in capsule	Do.	Nearly whole worm ..	Free up to 6 months.
13	6½	Milk diet previous night. No purgative.	16	At same time.	Whole worm ..	....
14	30	Do.	48	Do.	Almost whole worm ..	Free up to 9 months.
15	14	Do.	25	Do.	Two whole worms (*T. solium*).	....
16	15	Do.	25	Do.	Almost whole worm ..	Free up to 9 months.
17	22	Do.	48	Do.	Two whole worms ..	....
18	35	Do.	48	Do.	Terminal segments only	Not cured. Passing segments again.
19	25	Do.	48	Do.	Almost whole worm ..	Free up to 7 months.
20	50	Do.	48	Do.	Part of strobila only ..	Not cured.
21	28	Do.	48	Do.	Part of strobila only ..	Free up to 7 months.
22	50	Do.	48	Do.	Part of strobila only ..	Free up to 6 months.
23	30	Do.	48	Do.	Almost whole worm ..	Free up to 4 months.
24	35	Do.	48	Do.	Almost whole worm ..	Free up to 2 months.
25	32	Do.	48	Do.	Whole worm ..	....

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doubt that carbon tetrachloride is a better drug than male fern for the removal of tapeworms. Another point is that as we have succeeded in curing at least the same percentage of cases with carbon tetrachloride by the mouth as Schneider has cured with male fern by the duodenal tube; our form of treatment is preferable because it is much simpler and less irksome to the patient. Indeed, although we have not yet used our method on out-patients because we wished to follow the cases closely for purposes of record in this paper, there is no reason why our latest and most successful method could not be used on these patients.

It will be noted that one of our cases passed two heads of *T. solium*. This is of some importance as it appears to be the first record of the removal of this species of worm with carbon tetrachloride, and, although the other drugs used for removal of tapeworms from human beings act equally well on *T. saginata* and *T. solium*, according to Daubney and Carman carbon tetrachloride will remove *Avitellina centripunctata* from sheep, but it is useless against the other cestodes of sheep or against the cestodes of dogs.

Tetrachlorethylene, a drug closely allied to carbon tetrachloride, has been advocated by some as a better and safer drug than the latter for the treatment of hookworm infections; we tried it on three cases of *T. saginata* infection, but as no action on these worms was apparent we did not try it further.

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GROUP-SPECIFIC SUBSTANCES IN THE HUMAN BODY.*

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THOUGH new information is constantly being brought to light, the main facts regarding the human blood groups are now fairly clearly defined. We know that there are four main groups with possibly some subgroups, that these special blood characters are inherited according to the Mendelian law, almost certainly according to the formula of Bernstein which postulates three factors A, B and 0 any two of which may be present together. The first two of these are dominant to the last. It is also well known that considerable use of these blood characters has been made for surgical, anthropological, genetic and forensic purposes.

Owing to the confusion produced in the literature by the differing numerical nomenclatures of Moss and Jansky, the above nomenclature of two letters and a zero is now in universal use and is spoken of as the international nomenclature. The nomenclature assumes the existence of two agglutinable factors A and B either or both or neither of which may be present, giving rise in this way to the four groups. On this basis it follows that:—

In the group called I by Moss both A and B substances are present = group AB.

In the group called II by Moss the A substance alone is present = group A.

In the group called III by Moss the B substance alone is present = group B.

In the group called IV by Moss neither substance is present = group 0.

The modern notation is directly derived from the original conception of Landsteiner and it will be seen from what follows that the existence of these two substances A and B is now an ascertained fact.

The demonstration of these special biochemical characters has been made mainly, though not entirely, by means of tests based on the movements of the red blood cells to form clumps under the influence of normal sera of other groups, *i.e.*, by iso-agglutination effects. In the nature of things this technique can only be applied to tissues such as the blood in which the cells are freely floating, and possibly also to the sperm.

Until quite recently no satisfactory method has been available for examining the group of a fixed tissue cell or a fluid, and it is no doubt very largely due to this experimental difficulty that it has been tacitly assumed that the group-specific properties were limited to the blood. The term "blood group" accordingly came into use. A moment's thought will suggest that as the group-specific properties of the erythrocytes are also shared by the serum, the tissues of the body generally, or at least those in direct circulatory connection with the blood, would be expected to show the same group-specific action, since the qualities of the kidney, liver, etc., are just as much a part of the Mendelian inheritance as the blood. Many experiments have been performed on the question, but for the most part they failed to be convincing owing to the absence of a really adequate technique.

* This paper was read at a meeting of the Calcutta Branch of the British Medical Association on 13th November, 1931.

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We shall see later how by the use of an entirely new method we can determine with absolute accuracy the group of a piece of kidney, liver or pancreas. The method is also applicable to the examination of secretions or excretions, several of which have been shown to contain the group-specific substances. By the use of the new technique it has now been completely demonstrated that this special biochemical stamp which we term the "group" is present in human tissues, secretions and excretions generally. The term "blood group" is therefore insufficiently comprehensive, and should be replaced by the term "group".

In general, information regarding the A substance is more definite than that regarding the B substance and for simplicity's sake we shall limit our remarks largely to the A substance. This substance is present in saliva. It is contained in the mucous membrane of the mouth, stomach and small intestine, though not in the fæces. It is also present in large quantity in the pancreas and may be definitely demonstrated in a 1:10,000 dilution of a pancreatic extract. It occurs also in the urine, though not in great quantity, and to extract it therefrom a large volume of urine is required. It is extremely stable, not being destroyed by boiling or by strong alkalies, but is destroyed by boiling with strong alkalies. It may be soluble in water and not in alcohol, or soluble in alcohol and not in water. This point will be referred to again. The A substance is possibly produced in the gastro-intestinal mucosa or it may be that it is only excreted there. Gastric juice contains much. Its absence from the fæces is apparently due to the destructive effect of bacterial contamination, since bacteria-free extracts of fæces do not destroy it. It occurs in very high concentration in the sperm.

We may now examine in rather more detail what is known as to the distribution and chemistry of these substances. We know, as already stated, that the group substances A and B are found not only in the erythrocytes but also in the organs generally, and that they are to a considerable extent in a water-soluble form. Water-soluble group substances have been found in the kidney, heart muscle and skeletal muscle, also in the lung and aorta and in small quantity in the brain. Water-soluble group substances also occur in the body fluids. In the cerebro-spinal fluid they exist in small quantity. Considerably greater quantities occur in urine, and still greater quantities in saliva, gastric juice and intestinal juice. Both milk and bile also contain the water-soluble substance. Alcohol-soluble group substances are also present in the red blood cells and organs. On the other hand the alcohol-soluble substances are absent from all the secretions and excretions examined. While the water-soluble substance of the kidney at any rate in part leaves the body in the urine, the fate of the much greater quantity in the digestive juices is uncertain. It is possible that the group substances of the saliva, stomach and intestinal juice are destroyed in the large intestine or they may be reabsorbed. For the study of the chemistry of these substances urine and saliva have been chiefly used. From these highly active water-soluble substances have been obtained. The preparations obtained were non-dialysable, heat stable and contained no protein, carbohydrate or lipoid. Pepsin, trypsin and yeast have no action on them. The purified urine and saliva preparations still contained a small quantity of nitrogen. The water-soluble form of the A substance found in the secretions, if chemically different from the lipoidal form of the A substance found in the organs, must contain the same serological receptors since they inhibit in exactly the same way the A-specific hæmolysin. On the other hand the two forms of the A substance may be distinguished by complement-fixation experiments. Only the lipoid form gives distinct complement fixation. These substances are not found in the human body alone. Sheep erythrocytes contain the A substance in the lipoid form only. By heating with alkali it is possible to convert this A substance into the water-soluble form. The possibility exists therefore that the group substance is really a lipoid which on saponification becomes water-soluble. We are now in a position to understand why the A substance may sometimes be soluble in alcohol and not in water and sometimes the reverse. The presence of the water-soluble form alone in the secretions and excretions would thus suggest that a saponification process takes place in the organism.

We may now consider briefly the application of this new knowledge. No results of surgical importance can be expected, and anthropological and genetic generalisations will naturally be worked out from the groups of the blood. It is in the forensic sphere that this new work has such far-reaching importance. It has already been stated that the group substance is present in very large quantity in the semen, and in one case analysed by Schiff in Germany the determination of the group of a specimen of semen was the deciding factor in the case, and his results were perfectly definite even in a 1:100,000 dilution of the sperm. The forensic importance of this is obvious. As regards saliva, this opens up the question of the possibility of detecting the group of a person who has licked an envelope or who smoked a particular cigarette. The possible animal origin of the gum of the envelope has to be considered, but the unlicked portion will be available as a control. The discovery of the group-specific substances in the organs has as its most important application the examination of old material, such as cadaver material, from which it would probably be impossible to obtain blood

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materials in suitable condition for iso-agglutination tests. There are many such cases in which the determination of the group of an organ would be of importance. We will suppose the issue is whether particular organs could have been derived from a specified person. It is first necessary to know that the organ is human. If it has actually been removed from a human body by a responsible person, tests for human origin may be dispensed with, but if it has been dug up out of the ground or its source is for any reason uncertain, whether its origin is human or otherwise must first be determined by the precipitin test. It is next necessary to know what the group of the specified person is if he be alive, or what it was if he be dead. In favourable circumstances the latter problem is more easily solved than might be expected. In the large hospitals of Berlin the blood group of every patient is determined on admission and the report is added to the dossier. Should such a person, say five years after discharge from hospital, be missing and cadaver material be found, the group-specific test can be applied to the organs found, and if they differ in group from that given in the record which will be available from the hospital the said organs cannot have belonged to the person under consideration. These group-specific tests both of blood and of the tissues can in no case prove that they have been derived from a given person, since the same results would be yielded by two different persons of the same group. They can only prove the contrary, *i.e.*, that the blood or tissues have not originated from a given person in cases where the group of the person differs from that of the organs.

We will now consider briefly the method by which the A substance is demonstrated. We first of all require an anti-A rabbit serum. This is prepared by injecting into a rabbit human erythrocytes of group A. These must be washed in the usual manner, but it is not necessary or even advisable to wash too much, since the serum also contains the A substance and too thorough washing only weakens the antigen unnecessarily. The resulting antiserum contains anti-human and anti-A factors. It is also hæmolytic for sheep's erythrocytes. This last is the heterophile antibody of Forssman, and it is by the presence or absence of this last effect that the experimental result is obtained, since if the A substance is present in the solution under test, it absorbs the anti-A factor from the serum, which will thus not be able to hæmolyse sheep cells subsequently added. The serum prepared as above is before use first inactivated and then absorbed with human erythrocytes of group 0 to remove the anti-human factor. We now have an antiserum which is hæmolytic to sheep cells, but which, if previously absorbed by the group A substance, has no hæmolytic power on sheep cells. We next titrate it with complement and washed sheep cells to determine the hæmolytic dose and we take four hæmolytic doses for our main experiments.

To illustrate the working of the method we will take first the case of two human bloods of groups A and 0, respectively. We first wash well the cells of these two bloods. Then place four hæmolytic doses of the antiserum in each of two tubes. To one add excess of group A cells, and to the other excess of group 0 cells. Allow to stand for some time, shaking occasionally. After centrifugation set up these two absorbed sera with the appropriate dose of sheep cells and complement and incubate. It will be found that the anti-A serum absorbed with group A blood can no longer hæmolyse the sheep cells, whereas the same serum absorbed with group 0 blood hæmolyses the sheep's cells completely. We have thus demonstrated the presence of the A substance in one human blood and its absence from the other.

To illustrate the application of the method to a fluid we will suppose that we have two specimens of saliva, one from a person whose blood group is A, and the other from a person whose blood group is 0. A pair of tubes is put up containing different dilutions of the A saliva, then two similar tubes with the same two dilutions of boiled and cooled A saliva, and finally a third pair of tubes containing the same two dilutions of group 0 saliva. To each is added the appropriate dose of the anti-A serum. After absorption, the correct dose of sheep's cells and complement is added and the mixture incubated. It will be found that in the two tubes containing the unboiled group A saliva there will be no hæmolysis, showing the presence of the A substance. Similarly in the two tubes containing the boiled group A saliva there will be no hæmolysis, showing that the A substance is unaffected by boiling. In the two tubes containing the group 0 saliva, however, the hæmolysis will be complete, showing the absence of the A substance. It is usual in this experiment to set up alongside a parallel set of tubes, using instead of anti-A serum a genuine sheep hæmolysin (prepared by injecting sheep erythrocytes into a rabbit). In this last series the hæmolysis will be complete in all the tubes, as the genuine sheep hæmolysin has no group-specific action.

Lastly as to the method of determining the group of an organ. We will suppose that portions of two human kidneys are provided from persons whose blood groups are or were A and 0, respectively. This is a very simple matter in the Berlin hospitals, for, as the group of the blood of every patient is determined on admission, all post-mortem material is in effect already grouped. This provides a useful check on the correctness of the entirely different grouping procedure which is applied directly to the organs.

To group the kidneys directly, a small quantity of each is weighed out and cut up very

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small with fine scissors and finally rubbed to a liquid in a mortar with distilled water and placed in a small flask. After standing for some time it is boiled for twenty minutes. It is then centrifuged and the supernatant fluid taken to dryness on a water bath. The residue is then taken up in normal saline. The subsequent steps are as in the preceding test for the grouping of a fluid. A control is required to exclude general anti-complementary action.

While others have contributed to this new extension of serological work, by far the largest share is the work of Dr. Schiff in Berlin in whose laboratory I was privileged last winter to carry out these tests, even while his work was still unpublished; now that Dr. Schiff's book (1931) has appeared I am able to bring these new methods to the notice of the profession here in Calcutta.

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A CASE OF PRIMARY SARCOMA OF THE HEART.

By VISHWA NATH, M.A., M.D., F.R.C.P.I., D.P.H., D.T.M. & H.,
Department of Pathology, King Edward Medical College, Lahore.

A MOHAMMEDAN beggar woman, Barkat, aged about fifty, was admitted to the Mayo Hospital, Lahore, on the 1st of July 1931 with moderate general anasarca and intense dyspnœa. She died about fifteen minutes after her admission. The house physician remembered that the patient had been in his ward on a previous occasion for a short time. The complaint at that time was also urgent dyspnœa which could not be relieved during her short stay in the ward. No medical history of this visit could, however, be traced in the hospital records.

The positive autopsy findings were as follows:—

Abdomen.—About a pint of free fluid was present in the peritoneal cavity. The spleen was enlarged and firm; its capsule was thickened and wrinkled; a calcified nodule with a sulcus round it indicated an old, healed infarct. On section trabeculæ were prominent and the pulp well set in the trabecular frame-work. The liver showed chronic venous congestion. The kidneys showed increase in the pelvic fat, but the size and surface were normal.

Lungs.—On the right side there were a few adhesions between the visceral and parietal pleuræ. Just below the apex of this lung there were a few calcified nodules indicating old, healed tuberculosis.

Heart.—The pericardial sac contained six ounces of clear straw-coloured fluid. The heart showed on its anterior surface below the pulmonary artery a prominence surmounted by a few opaque nodules. The lower half of the anterior surface and the entire posterior surface of the heart looked normal. On opening the heart no abnormality was detected in the chambers or valves of the left side. The myocardium of the left ventricle showed no appearance of hypertrophy, scarring, or of tumour nodules. On the right side, the auricle showed a small nodule on its septal surface. The tricuspid valve was normal. Surrounding the opening of the pulmonary artery and deforming its valves was a verrucous growth, which extended on the one hand as a tight plug into the lumen of the pulmonary artery for an inch and half, and on the other spread into the adjacent myocardium, appearing on the surface of the heart just below the pulmonary artery as an elevated, round mass studded with nodules of varying sizes. Careful search was made for an extra-cardiac primary focus or metastasis, but without success. Two photographs are inserted showing the gross features of the growth. The first (fig. 1) shows the anterior surface of the heart with the tumour mass situated at its base. The pulmonary artery has been cut open

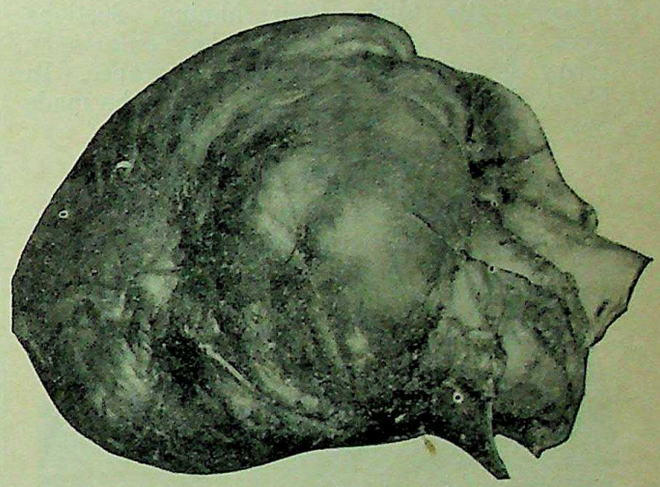

Fig. 1.

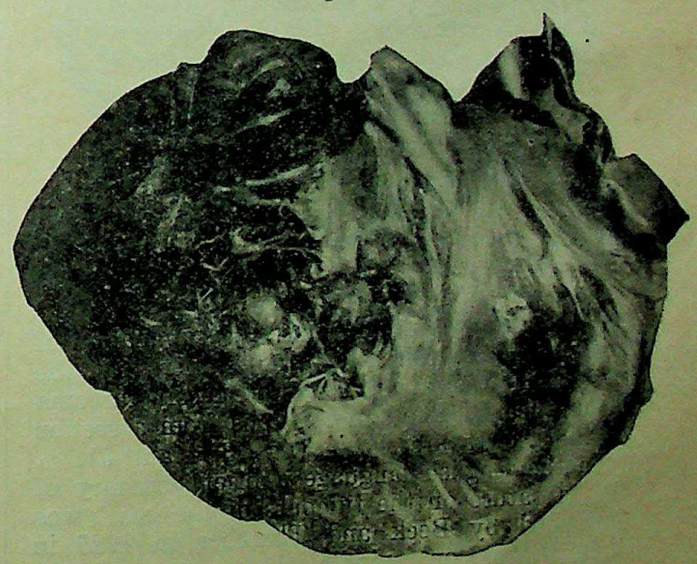

Fig. 2.

in its longitudinal axis; the tumour mass is seen plugging its interior. The other (fig. 2)

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shows a small white nodule on the septal aspect of the right auricle, and an irregular mass obstructing the opening of the pulmonary artery.

Sections were prepared from the liver, spleen, lungs, mediastinal glands and the different parts of the growth. The liver and spleen showed chronic venous congestion. The lungs showed no special pathological condition. The mediastinal glands (which were not grossly enlarged) showed no definite neoplastic deposits. Sections from the growth showed it to be composed of round cells of different sizes, embryonic blood vessels, tumour giant cells and mitotic figures. Large round cells showed eosinophilic cytoplasm and eccentrically-disposed nuclei. The giant cells were studied with particular care and their cytoplasm, which in some of them was fairly abundant, for evidence of striation, so as to exclude the possibility of the growth being a rhabdo-myosarcoma. No evidence of striation was obtained. Some of the vessels in the sections showed plugs of tumour cells filling their lumina. Sections from the mass plugging the pulmonary artery showed a structureless appearance. In places shadows of necrosed cells could be made out.

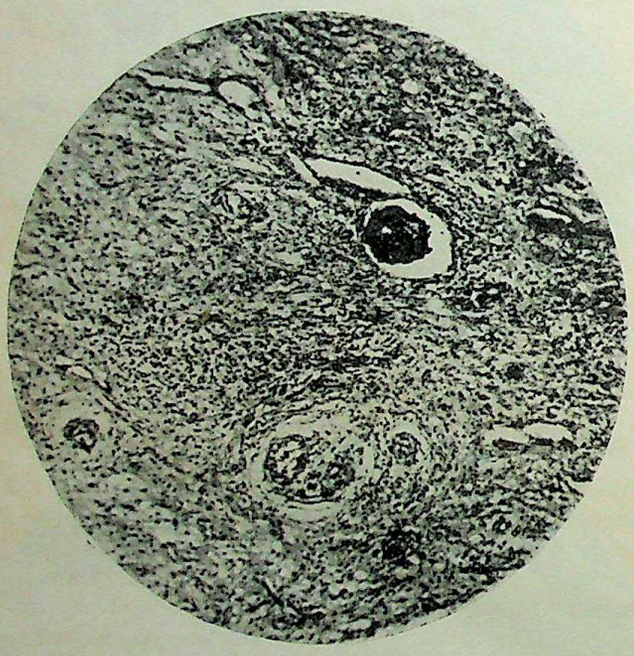

Fig. 3.

The autopsy findings and the examination of sections have convinced the writer that the neoplasm was a primary round-cell sarcoma of the heart. Photomicrographs from a section of the growth are shown (figs. 3, 4 and 5).

In the English language a brief summary of the literature on the tumours of the heart was furnished by Beck and Thatcher in 1925 in their paper on spindle-cell sarcoma of the heart, and again by Bradley and Maxwell in 1928 in their paper on primary neoplasms of the heart. These papers stress the fact that tumours of the heart are uncommon, that primary growths are rare, and that primary sarcoma of the heart is a *very* rare finding: also that primary tumours are commoner in the auricles than in the ventricles, the left side being more commonly affected than the right. An analysis of the intra-cavitary tumours

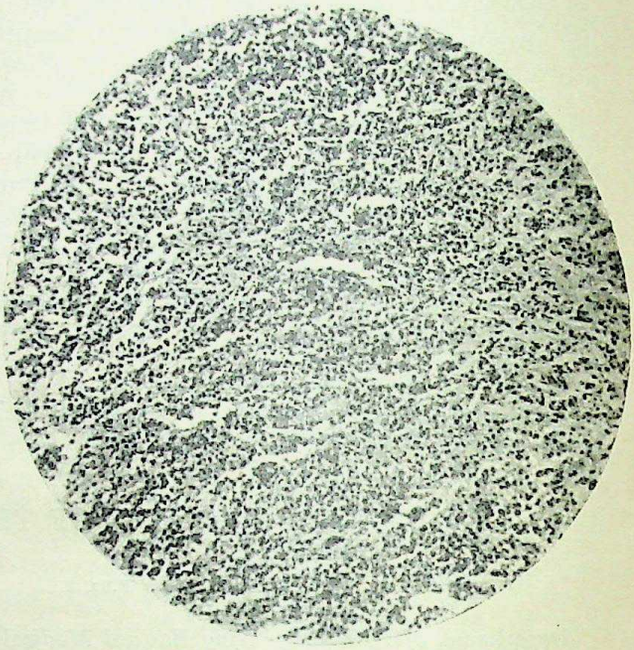

Fig. 4.

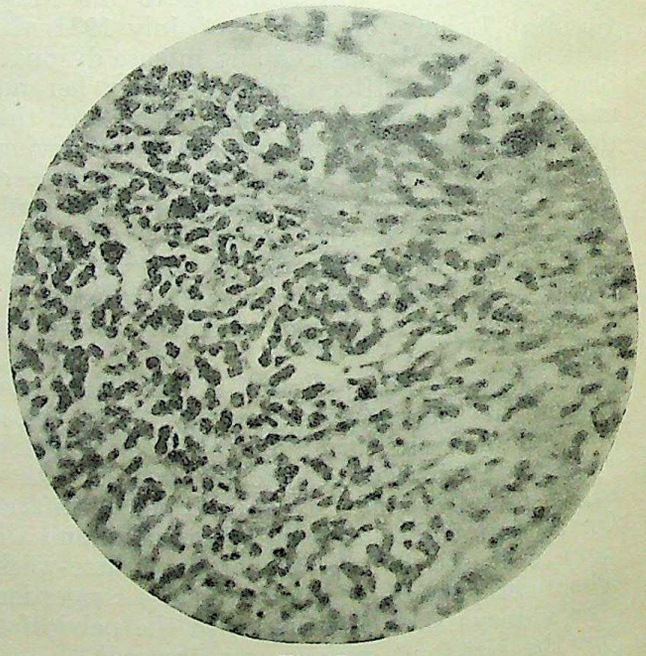

Fig. 5.

reported by Meroz (Bradley and Maxwell, 1928) showed the following distribution:—left auricle–30, left ventricle–5, right auricle–1, and right ventricle–4.

Beck and Thatcher, taking both extra- and intra-cavitary tumours together, give the following incidence:—left auricle–24, left ventricle–8, right auricle–10, right ventricle–14, valve tumours–16, both auricles–3, both ventricles–2, right auricle and ventricle–2, left auricle and

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ventricle–2, and inter-auriclar septum–2. Of primary sarcomata of the heart, till the publication of Bradley and Maxwell's paper, the number reported appears to be 38. So far as the histology of these sarcomata is concerned, the following are the figures given with regard to 31 cases investigated:—round-celled–10, spindle-celled–12, giant-celled–4, myxo-sarcomata–3, angio-sarcomata–1, and lympho-sarcomata–1. It appears from the *Quarterly Cumulative Index* that up to October, 1930 four more papers, three German and one French, have been contributed on the subject. These papers, however, were not available to the writer. From the literature consulted no case of cardiac neoplasm appears to have been reported so far in India. The case here reported is also rare in that there are only two cases reported of cardiac neoplasms affecting both the right auricle and the right ventricle. Also of the sarcomata, the histology of which has been quoted, only ten have been reported to be round-celled.

It is unfortunate that no clinical history worth the name could be obtained in this case, but the outstanding complaint was a severe dyspnœa. In this connection it will be interesting to note a case of "primary round-celled sarcoma of the heart—probably a lympho-sarcoma" reported by Steele in 1926. This was in a well-nourished woman of 40, who suffered from frequent attacks of breathlessness and was in constant distress. The dyspnœa could only be controlled temporarily with morphine. Autopsy revealed a sarcomatous growth in the wall of the right auricle, which also involved the superior vena cava.

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AN ANÆROBIC URINAL.

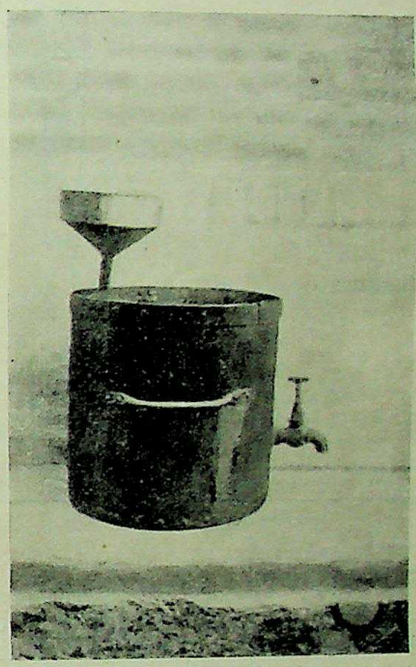
By R. C. WATS,
MAJOR, I.M.S.,
and
ASSISTANT SURGEON W. I. WHITE, I.M.D.
(*From the District Laboratory, Maymyo, Burma.*)

IN almost all barracks a movable pail or receptacle is used as a night urinal. This is placed outside the barrack room and removed every morning by a sweeper. Such urinals necessitate a great deal of labour and supervision, in spite of which they cause a certain amount of nuisance as regards smell, and may prove to be the origin of a typhoid epidemic if neglected.

The same may be said of the day urinals, which require to be emptied daily, and need to be tarred and scrubbed regularly. If not attended to in this way, even for a day, the smell emanating from them, specially during summer, is intolerable. The same applies to urinals of public institutions, such as schools, clubs, and parks where the receptacles in use require attention several times a day.

To obviate the necessity of the constant attendance of a sweeper, one of us (R. C. W.) suggested the following design:—

The receptacle consists of an iron pail of 15 gallons capacity (or more according to requirements), which has a brass tap about two and half an inches above its ground level. The tap terminates internally in a bent tube about two inches in length, almost touching the internal wall of the receptacle. The usual funnel arrangement serves as a antisplashing device



(see diagram), the tube of the funnel extending almost to the bottom of the pail.

Before use the pail is filled up to a height of one inch with water, on top of which is floated a layer one inch in thickness of equal parts of crude and kerosine oil (the cheapest variety available). The funnel on its inner surface is coated with tar or crude oil.

When the urinal is full the tap is opened and urine allowed to flow into a bucket, to be disposed of according to the system in vogue in the station. The renewal of oil is not necessary for months as the oil does not flow out owing to the bent tube attached to the tap; but some kerosine oil may be added once a month in very hot climates, as the paraffin oil has a tendency to evaporate.

The device described above will not require any attention for at least a week if used by six adults day and night, but for a larger number of people, more receptacles may be installed, or the same principles may be applied for construction of larger pails. In clubs, parks, schools, etc., the above standard-size

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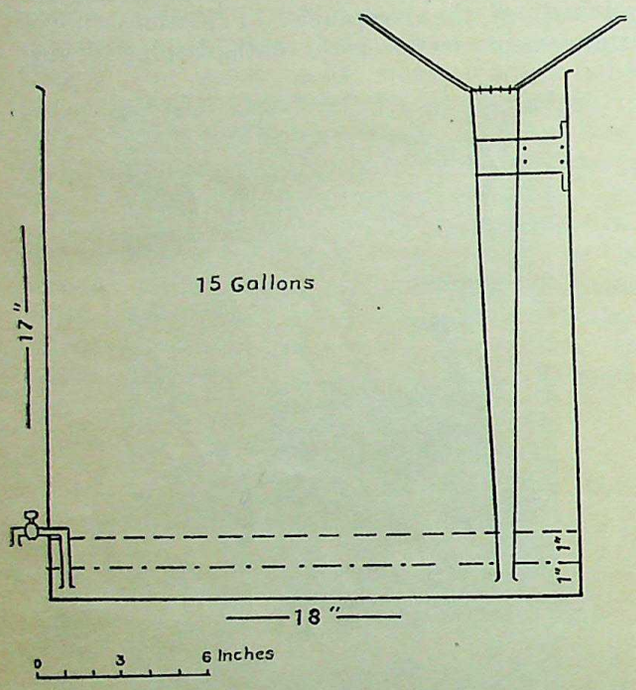
urinal would not fill up for a long time as it would be in use during a part of the day only.

I. Practical experiments with the above urinal.

Three urinals of the above pattern were constructed and installed, two in a family of two adults and two children, and one in the laboratory for use of the staff. These have been in regular use and constant observation for over a year. There has been no smell or nuisance of any kind, the laboratory one being used by three adults during working hours only, required draining once a month only.



It may be added here that at the time of the removal of the urine, the smell is undoubtedly bad, but in a well-aired latrine when the urine is removed it does not linger long. Thus if there is any nuisance it is not oftener than once a week.

II. Bacteriological findings.

(1) A broth culture of *B. typhosus* was introduced daily into a glass model of the urinal, which consisted of an inverted bell jar containing fresh urine covered with a layer of the oil mixture. For three consecutive days samples of the urine were withdrawn and used for isolation of *B. typhosus* with a negative result.

(2) A series of six similar experiments were carried out in the standard urinal described above, *viz*, after adding about 500 c.cms. of broth culture of *B. typhosus*, attempts were made to isolate the bacilli by inoculating both solid and fluid media with a sample of the urine every day.

The results were all negative, except on one occasion when an organism biochemically and morphologically resembling *B. typhosus* was isolated on the first day (but never after). This organism differed from the original strain introduced, in respect of agglutination, requiring subculturing for a week before it was agglutinated by the homologous high-titre serum.

The negative results were probably due to the antiseptic action of the sulphur compounds present in the crude and kerosine oils, as well as the high alkalinity of the urine stored under anærobic conditions. From the fifth day onwards after installing and using the urinal, the reaction of the effluvia was strongly alkaline. (It required 60 c.cms. of N|I sulphuric acid to neutralise a litre of the urine.)

Summary.

1. The construction of an anærobic urinal is described above.
2. It is economical, in that it requires attendence by a sweeper only once a week, and even not so often if larger receptacles are constructed. It may not require attention for months if a central tank is constructed on the above principle, to which urinals are connected by a pipe line. The conversion of the receptacles in common use in the military barracks does not cost more than five rupees.
3. Mosquito and fly breeding is impossible in the contents and neither can the flies feed on the urine and broadcast the pathogenic organisms.
4. Urine being considered the most infectious agent excreted by typhoid carriers, the introduction of this urinal should be encouraged, as it kills the pathogenic bacilli through the natural putrefaction by alkaline effluvia and by antiseptic action of the surface oil.

AN OPERATION FOR UTILISING THE MIDDLE FINGER AS THE "TRIGGER" FINGER.

By P. C. DUTTA, M.B., F.R.C.S. (Edin.), D.G.O.,
CAPTAIN, I.M.S.,
Waziristan District, Razmak.

NOT infrequently it happens that as a result of an injury or infection a soldier has to be invalided out of the Army on account of the partial or total loss of the index finger, or of its impaired mobility through ankylosis of the smaller joints. Though the injury is often trivial and the man is perfectly fit otherwise, not being able to grip the rifle and pull the trigger efficiently, he is useless as a soldier. To lose an otherwise healthy man simply for disability of the index finger is a great loss to the Army. It is an economical loss as well, because the man has to be pensioned off.

I have, on several occasions, done the following operation for these men and am quite satisfied with the results.

In immobility of the joints of the index finger or loss of one or more of the phalanges, it is best to amputate the finger altogether; otherwise the finger or the stump will always be in the way of the free movement of the middle finger while pulling the trigger or manipulating the bolt.

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The operation aims at,

(1) approximation of the middle finger and the thumb,

(2) insurance of independent movement of the middle finger, and

(3) provision of extra strength to the newly made "trigger" finger, *i.e.*, the original middle finger.

Technique.

A racket-shaped incision is made on the dorsum of the hand. The handle of the racket starts from the knuckle of the index finger and runs transversely inwards (towards the ulnar side) and slightly upwards for about 1½ inches. The loop of the racket encircles the base of the index finger. The extensor tendon of the middle finger is pulled out with a hook and the slip of the tendon attaching it to that of the ring finger is excised. This allows independent movement of the middle finger when the rifle is gripped with the little and the ring fingers. The tendon of the extensor digitorum communis going to the index finger is cut just distal to the point where the tendon of the extensor indicis proprius unites with it. A silk thread is passed through the proximal end of the cut tendon and kept clamped with an artery forceps, otherwise it may be difficult to find it later.

The index finger is then amputated; the second metacarpal bone being divided just above its head. The extensor tendon of the index finger already isolated is then fixed on to the extensor tendon of the original middle finger. This ensures stronger and quicker extension of the finger. Moreover the patient being already accustomed to use that part of the extensor digitorum communis concerned with the movement of the original index finger and the extensor indicis proprius in the manipulation of the bolt and trigger, involuntarily uses the same muscles for the newly made "trigger" finger. It also renders the training of the finger easier. Theoretically this action may be facilitated by fixing the flexor tendons of the index finger to those of the middle finger. But personally I do not approve of this, because, firstly, it causes too much interference with the tissues and secondly, as nature does not provide a special flexor muscle for the index finger alone (as it does in the case of the extensor, *viz*, the extensor indicis proprius), it appears to be unnecessary.

The excision of the head of the second metacarpal bone is important as it produces good approximation of the newly-made index finger and the thumb; this is required for the easy manipulation of the trigger and bolt. If the second metacarpal is totally removed, it no doubt produces better approximation and would certainly make the manipulation of the bolt easier. But the following facts render it inadvisable. The first interosseii are mainly responsible for abduction, adduction and rapid finer movements of the thumb, as well as for a good and strong grip. If the second metacarpal is removed, the first interosseii and a part of adductor pollicis are thrown out of action, which will certainly interfere with the efficiency of the soldier, and mere approximation would not compensate for it.

Post-operative treatment.—Passive and active movements of the finger should be started as early as possible. About ten days after the operation, the patient should start manipulating the bolt and trigger of a rifle. I found that manipulation of the bolt was always more difficult than pulling the trigger. In moving the bolt forwards, pushing with the base of the palm, would render it easier in the early stages. The patient usually becomes fit for service by the end of the third week.

(*Note.*—We have shown this paper to a senior military surgeon; he considers that this method of making an unfit soldier fit for service is an original one, but he expresses some doubt as to the *final* result of such an operation.—EDITOR, *I. M. G.*)

A Mirror of Hospital Practice.

TWO CASES OF IRREDUCIBLE HERNIA RELIEVED BY ATROPINE SULPHATE.

By G. R. KHURANA, M.B., B.S.,

Civil Hospital, Kulachi District, D. I. Khan, North-Western Frontier Provinces.

I WAS called to a neighbouring village to see a patient, who was suffering from vomiting and severe abdominal pain. On examination, I found the patient suffering from strangulated right inguinal hernia. The swelling in the scrotum was very tense and did not yield to my taxis. The patient got this trouble whilst jumping in order to cross the canal. I remembered having used atropine sulphate gr. 1/100 in Jandola Hospital for a similar case, and I tried it in this case also. Within 20 minutes' time, without any sort of manipulation on my part externally, the whole of the descended gut returned to the abdominal cavity with a gurgling noise. The patient was thus relieved promptly.

Case 2.—M. D., aged 30 years was brought to the hospital on 12th August, 1931, on a charpoy. On examination he was found to have an irreducible strangulated left inguinal hernia, and he could not lie in any direction due to severe pain in his abdomen. The swelling was hard, tense, extremely tender and painful and without any impulse on coughing. The patient had had the hernia for the past ten years, and every time he used to reduce it himself by taxis, but this time he was unsuccessful. I injected atropine sulphate gr. 1/100 subcutaneously and then began to apply taxis. After 40 minutes, when taxis was given up, the hernia reduced itself with prompt relief to the patient.

I think atropine sulphate is a marvellous drug in this condition and it should be tried in outlying dispensaries in such emergent cases. I advised these patients to have operations performed, but they refused, for in 1929 I heard that a patient with strangulated hernia had been operated upon by a barber for "an abscess," resulting in death due to excision of a portion of intestine.

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INVASION OF THE NASAL CAVITY BY A LEECH.*

By HARISH CHANDRA ASTAVANS, L.M.P.,
Najibabad, District Bijnor, United Provinces.

A HINDU MALE, aged 25 years, came to me complaining of the presence of a worm in his nasal cavity. He also added that the worm found access to his nose while he was drinking water in a pond a month previously, but that he had appreciated its presence only for the last three days. He also suffered from occasional epistaxis.

On examination I could see the worm, but it was rapidly lost to view in the naso-pharynx. I, therefore, definitely concluded that the worm was there and awaited its reappearance with an artery forceps in my hand ready to secure it, but I was disappointed for it did not appear for about 15 minutes. I then applied a turpentine swab to his nostrils, and placed my index finger firmly over the orifice of the naso-pharynx at the same time asking my assistant to douche out the nasal cavity with potassium permanganate lotion. The worm slipped up and down two or three times but ultimately it was caught in the artery forceps; it appeared that the worm was of enormous length. Subsequently it was extracted after a forcible pull and left in a tray of water where it remained alive for two days. The worm measured 5 inches in length and was identified as a leech.

The important points in the case are (1) that the worm lived in the air passages for more than a month, (2) that the patient felt no irritation beyond a feeling of uneasiness due to the shifting position of the invader, (3) the worm was of considerable dimensions.

A CASE OF LAMBLIASIS.

By K. C. BANERJEE, M.B.,
Suri, Birbhum (Bengal).

THE following case of lambliasis presents a number of unusual features, any one of which is remarkable in its own way.

A Hindu boy, aged 10 years, was brought to me by his father for pain in the abdomen. It was reported that the boy had pain off and on during sleep all over the abdomen which made him double up, even though he was kept on strict and regular diet. On examination, he was found to be a pale, anæmic, poorly-nourished boy. There were purpuric spots (petechiæ) around the ears and on the front of the legs. There was no tenderness anywhere in the abdomen nor any muscular rigidity. The liver was slightly enlarged. There was no abnormality in the lungs or heart, but his pulse rate was 52 per minute. He was said to be habitually constipated, and his abdominal wall was more shrunken than usual. As it was very difficult to come to a definite conclusion about the diagnosis, I treated the case as a case of liver-disease (hypo-hepatism). After clearing the bowels with oleum ricini, ʒiii, at bed time, I put him on—

℞ Sodii salicylas	..	gr. v.
Sodii benzoas	..	gr. iv.
Ammon. chlor.	..	gr. iv.
Tinct. hyoscyami	..	♏ vii.
Sodii sulph.	..	āā.
Magnes. sulph.	..	gr. xv.
Sodii bicarb.	..	gr. x.
Tinct. boldo (*sic* !)	..	♏ vi.
Aquam	..	ad ℥iv.

fiat mist. Thrice daily.

He was also put on Radiomalt one teaspoonful twice daily after food. This treatment helped to clear up the petechiæ but there was no improvement in his general health nor did it stop his pain, even after a fortnight's treatment. A course of santonin treatment was given with the idea that it was a case of ascariasis.

Next I was called in to see him when he had fever—which came on generally in the afternoon and left him in the morning. This fever was followed next day by blood and mucus in the stool. The number of motions was 4 or 5 a day and he had severe tenesmus during defæcation. There was then prescribed—

℞ Ol. ricini	..	ʒiv.
Tinct. hyoscyami	..	♏ xxx.
Syrupus zingiberis	..	ss.
Mucilage acac.	..	q.s.
Aquam	..	ad ℥iv.

fiat mist.—to be divided into 4 doses. Each dose every 2 hours.

He was also given a course of 6 injections of emetine (½ gr. each) every alternate day with one Anabin pill every day. The fever was checked with a few grains of quinine, mucus and blood disappeared from the stools, and there was a long interval between pains. This time, too, petechiæ occurred and disappeared. Within 3 or 4 days he had bradycardia as before. He was put on colloidal iron with copper and vitamin D for anæmia but he did not put on strength at all, and soon the old pain re-appeared in all its severity. This time he had extreme anorexia with severe vomiting and the hæmorrhagic spots appeared as before. This time, too, ascariasis was thought of and thinking santonin had not acted I tried hexylresorcinol (0.8 gm.) in capsule on an empty stomach after giving him a saline cathartic. His stool was examined this time and a heavy infection with lamblia was found.

As there is no specific treatment for lambliasis I put the boy on—

(1)	℞ Paraffin liq.	..	ʒiiss.
	Mucilage acac.	..	q.s.
	Sodii bicarb.	..	gr. xv.
	Calcii lactas	..	gr. vii.
	Aquam	..	ad ℥iv.

—14 doses—one dose at bed time.

(2)	℞ Stovarsol tablets	..	14
	Dimol tablets (B)	..	14

One tablet (each) daily after food.

He was forbidden meat, eggs, and fish, and told to have boiled water. Within 14 days his pain disappeared, he had a normal appetite and his general health began to improve. He was put on the treatment for 7 days more after a week's interval. His stool, further examined, was absolutely free from any cyst or parasite. His pulse-rate was 74 per minute—which is his natural rate, and the previous hæmatinic treatment has much improved him.

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* Rearranged by the EDITOR, *I. M. G.*

[*Comment.*—We submitted Dr. Astavans' note to Dr. C. Strickland, Professor of Medical Entomology, Calcutta School of Tropical Medicine, who has kindly commented as follows:—

"With reference to your endorsement on the attached paper, Dr. Roy identified the leech as *Dinobdella ferox*, but awaited Professor Moore's return to Calcutta for confirmation. This I have now obtained.

The interest of the paper must be judged by existing records of infestation of the respiratory passages of man by leeches in general and *D. ferox* in particular.

As for the former there are many, the majority of which seem to have been in Egypt and nearby countries due to *Limnates* spp.

As for the latter there have been no previous records of such a case in man, though the nasal cavity of cattle is the normal habitat of the species. The history given by the writer is in accord with the usual history in animals."—EDITOR, *I. M. G.*]

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CALCULUS HYDRONEPHROSIS IN A HORSE-SHOE KIDNEY.

By GLADYS H. MARCHANT, M.D., F.R.C.S. (Eng. and Edin.), D.O.M.S. (Lond.),
Jaya Arogya Hospital, Gwalior.

THE following case appears to be worthy of record on account of the rarity of renal stones in females and also because of the condition revealed afterwards.

The patient, a Hindu child-widow, aged about 40 years, was admitted to the Jaya Arogya Hospital, Gwalior, on 8th March, 1931, complaining of a tumour in the abdomen of four months' duration.

There was nothing of note in the personal history, but the family history elicited the fact that an aunt had died, unoperated upon, of a similar tumour.

The patient herself had suffered since childhood from acute attacks of pain and vomiting, associated with a swelling in the right lumbar region. The symptoms had hitherto yielded to fomentations. These attacks had recurred at irregular intervals, and she had been treated at various hospitals for colic or colitis. There was no history of dysuria.

On admission she was seen to be a spare, anæmic woman with severe pyorrhœa alveolaris. Except for a coated tongue and constipation the alimentary system was normal. The respiratory, circulatory and nervous systems showed no abnormality. A large tumour was visible occupying the right loin and lumbar region, extending medially as far as the umbilicus, upwards to the costal margin and downwards to the iliac crest; this area was covered by old marks of branding. It was oval in outline, felt like a tense cyst, and was dull on percussion. The dulness was continuous with the liver dulness above and the area was extremely tender. The pain complained of was localised to the tumour, and not referred to the perineum or leg. It had been continuous for the previous 8 days. There was slight difficulty in micturition, but this was only elicited by direct questioning.

Urine examination.

Quantity in 24 hours ..	100 oz.
Specific gravity	1,020.
Reaction	Alkaline.
Albumen	Nil.
Sugar	Nil.
Bile	Nil.
Blood	Nil.
Deposit	Phosphates, urates and pus cells.

Blood examination.

Total leucocyte count ..	12,200 per c.mm.
Differential leucocyte count	....
Lymphocytes	11 per cent.
Large mononuclears ..	3 "
Eosinophiles	7 "
Polymorphonuclears ..	79 "

The diagnosis of right hydronephrosis was made and on screening a large stone was seen (*vide* skiagram).

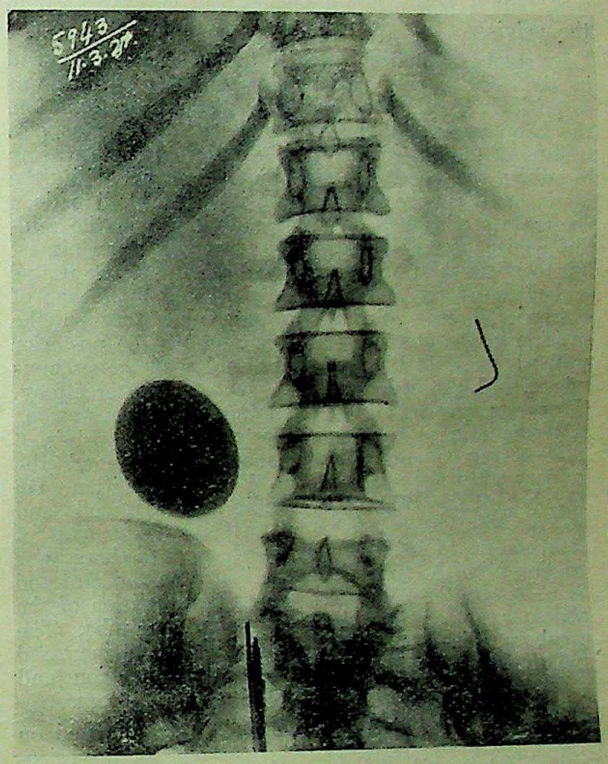
Cystoscopy and catheterisation of the ureters was not done, as it was obvious from the size of the tumour that the right kidney was not functioning.

At operation under chloroform the tumour was exposed by a prolongation of the usual lumbar incision. The capsule was adherent to the perinephric fat and the tumour was too large to be delivered out of the wound. On tapping with a trocar and cannula some 2½ pints of foul-smelling purulent urine was withdrawn and the stone removed. In freeing the kidney from adhesions the pyonephrotic sac ruptured in two places. No distinct pedicle at the usual site could be found and in following the tumour down it was seen to have its lower pole connected with the opposite kidney by a band of kidney tissue 1½ inches in diameter, crossing the second sacral vertebra. Several renal vessels were isolated above this band and ligatured with silk. The ureter, which joined the pelvis of the kidney anteriorly, was ligatured and divided and the band of kidney tissue clamped as both the sutures and the ligatures employed cut through. The clamp was left *in situ* for 48 hours. After removal of the tumour the wound was rendered hæmostatic and cleaned and then partly sutured, the remainder being packed with acriflavine gauze.

Convalescence was stormy with an irregularly intermittent temperature touching 102°F. and a rapid pulse which on one occasion reached 160. A catheter specimen of urine taken two days after operation showed a *B. coli* infection which was treated with vaccines and alternate alkaline and urotropin therapy. After a fortnight the temperature subsided and the wound was healing satisfactorily; a sinus, however, persisted and the wound had to be re-opened two months later when a silk ligature was removed. Thereafter convalescence was interrupted by repeated attacks of *B. coli* infection.

Pathological examination.

(1) *Macroscopically.*—The major part of the kidney is reduced to a unilocular sac which contains one big stone the size and shape of a medium-sized hen's egg.



Kidney tissue proper is only present in the lower pole. Due to pressure the tissue in this region too is markedly flattened. The pyramids have lost their radiate appearance and are flush with the flattened cortex. The upper pole and the body of the kidney are converted into a big sac.

(2) *Microscopically.*—The interstitial tissue is prominent, the tubules are practically absent, and the whole substance is infiltrated with polymorphonuclear cells.

(3) *The stone.*—This is made up of rings and layers of phosphatic deposits round a small central mulberry-shaped calcium-oxalate calculus.

Discussion.—Horse-shoe kidney is found in 0.02 per cent. of necropsies. It is believed to be more common in females and to be more liable than the normal kidney to pathological changes.

An interesting point in differential diagnosis was the exclusion of hydatid cyst, which was

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suggested by the high eosinophil count and by the frequency of hydatid disease in Gwalior. No band of resonance corresponding with the colon crossed the tumour. Apparently the distending pyonephrotic sac had rotated forward and come to lie in front of the kidney.

TWO UNUSUAL CASES.

By A. H. HARTY,

MAJOR, I.M.S.,

Civil Surgeon, Sukkur.

Case 1.—On October 20th, 1930, a Hindu woman, aged 18, was brought to the Civil Hospital, Sukkur. The history was that she had started labour six days previously; it was a breech presentation and the body was born on the fourth day of labour; the *dai*, however, could not extract the after-coming head and after struggling with it for two days she finally severed the neck with a pair of blunt scissors and left the head in the pelvis.

External examination revealed the presence of the head in the pelvis; the patient's general condition was surprisingly good. On making a vaginal examination, the hand passed at once through a large transverse rupture of the posterior wall of the uterus; there was no bleeding; the head was fixed in the pelvis with the uterine wall closely applied over it. I decided to do a Cæsarean section and opened the abdomen in the mid-line below the umbilicus. The uterus was in an almost bloodless state, firmly contracted over the head; it was incised anteriorly and the head delivered by means of obstetric forceps. Pus then oozed up through the incision in the uterus, and the rupture on the posterior wall was seen to be very septic and with gangrenous edges, so I proceeded to do a subtotal hysterectomy. There was very little bleeding throughout the operation; a large drainage tube was inserted into the pelvis, a pint of intravenous saline was administered, and the patient returned to bed in Fowler's position. On October 21st, 1930, her condition was good and temperature normal; next day there was a rise of temperature to 100.8°F. and an offensive discharge was coming from the tube. She was better on the 23rd and 24th, but on the 25th there was some distension of the abdomen and a free discharge from the tube. The usual remedies were tried, but the distension increased and she died on the 26th, 6 days after admission, and at least 8 or 9 days after the rupture of the uterus.

Case 2.—A Hindu woman, aged 28, was admitted on September 29th, 1930, for the treatment of a vesico-vaginal fistula. She gave a history of difficult labour one year previously with dribbling of urine from the vagina commencing a few days after the labour. She was prepared for operation. A catheter was passed into the urethra, but it only entered for an inch, the urethra seeming to end blindly in the scar tissue around the fistula. The catheter was then passed into the bladder through the fistula and I noticed at once a rough, stone-like feeling; this was confirmed by means of a metal sound, so a lithotrite was passed and the stone crushed. I noticed that it was a soft stone; the fragments were removed by the evacuator, and it was observed that large shreds of mucous membrane and much epithelial debris were mixed with the stone. The lithotrite was inserted three or four times and I remarked that the bladder wall seemed to be coated in places with a calcareous deposit which could not be entirely removed, either by the lithotrite or by the evacuator. I decided to postpone the repair operation for a few days and the patient was sent back to the ward. Five days later the nurse showed me an offensive mass, the size of a walnut, which had been washed out of the vagina while giving the patient a douche; it was composed of cotton wool in the meshes of which was a calcareous deposit. When closely questioned the woman now admitted that after her confinement a *dai* attended on her daily for some weeks, during which time she gave her frequent vaginal douches and often inserted cotton vaginal plugs. This mass was undoubtedly then a portion of a vaginal plug, and so was the first "stone" removed at operation.

Two days later she was again prepared for the repair operation; wishing to make quite sure that the bladder was now clean I inserted a pair of fine-pointed forceps through the fistula and much to my surprise removed a similar mass heavily impregnated with calcareous deposit. The bladder was now thoroughly washed out and by means of the sound I made quite certain that there was nothing more inside. The repair operation was then performed, but I regret to say that it broke down on the fourth day and a week later the patient, feeling discouraged, left the hospital.

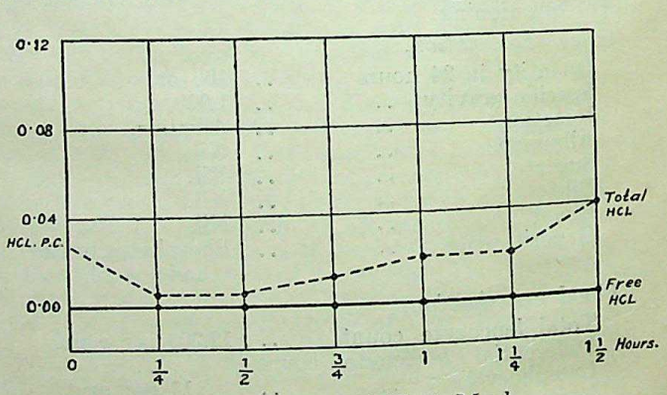
It appears from the history that these plugs of wool must have been in the bladder for at least 10 months; the calcareous deposit on them was so heavy that they were almost stony in nature. They were extremely offensive and of a dirty brown colour, but they do not seem to have given rise to any additional symptoms.

A CASE OF GASTRIC SYPHILIS.

By S. K. SUNDARAM, B.A., M.D.,

Second Physician, Head-quarters Hospital, and Lecturer in Chemistry, Medical School, Tanjore.

SYPHILITIC disease of the stomach would appear to be very rare according to text books. Recently, however, increasing interest is being evinced in the subject, and this offers sufficient excuse for record of the following case, particularly as it presents a special feature of its own.



Graph A. Fractional Test Meal.

Fasting contents:—About 15 c.cm. of viscid fluid with plenty of mucus. No free acids.

Test meal:—500 c.cm. of extra thin oatmeal gruel. Samples drawn in 1½ hours after test meal—about 60 c.cm.

(The gruel was watery and so the stomach emptied rapidly. After 1 hour there was very little of the gruel in the stomach.)

No free acid in any of the samples.

R., a drummer by profession, aged 25 years, was admitted into the medical wards of the Rajah Mirasdar District Headquarters Hospital, Tanjore (South India), on 18th December 1930, with a history of general weakness

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and pain in the epigastrium after food, of six months duration.

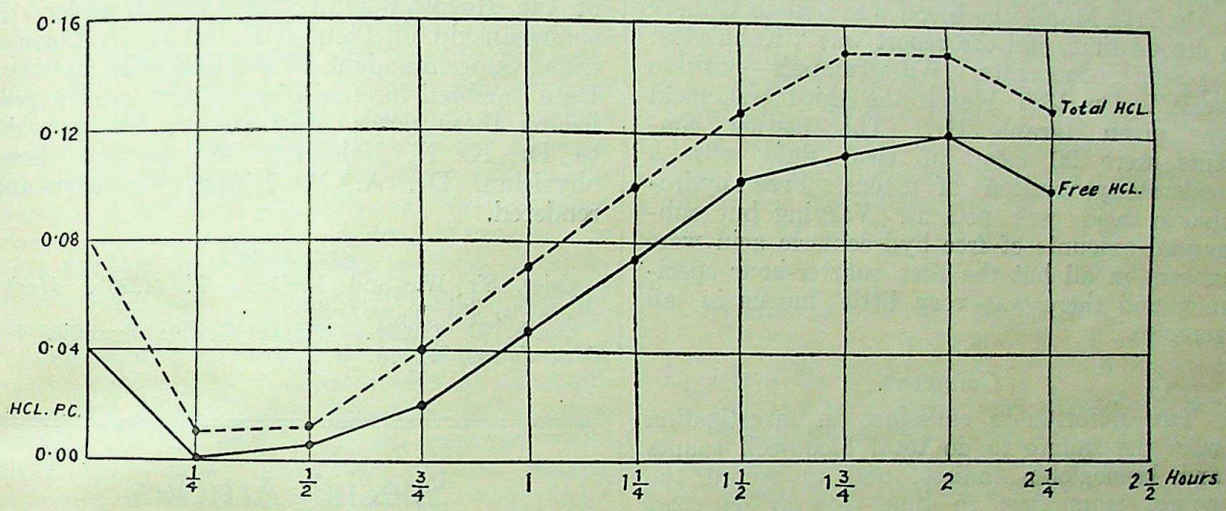
Three and a half years previously the patient had a sore on the penis, followed after a month by a rash all over the body. He underwent some quack treatment which brought on severe stomatitis.

There was a history of irregular fever for the last one and a half years. For the previous six months, the patient had had attacks of pain in the epigastrium immediately after food accompanied by visible waves of movement over the epigastric region. The pain lasted an hour and gradually subsided of its own accord. There was no history of vomiting. The appetite was impaired; the bowels were constipated as a rule; but the patient had never passed blood in the stools.

The patient presented a picture of emaciation with anæmia. His tongue was markedly fissured and he had bad pyorrhœa alveolaris. The epitrochlear glands were enlarged and shotty. The liver was palpable two fingers below the costal margin. The most noticeable feature was the marked visible peristalsis of the stomach, present day after day. There was no lump palpable.

The picture of secondary anæmia with eosinophilia and the finding of hookworm ova in the fæces, taken in combination with the common incidence of ankylostomiasis in these parts, suggested anti-hookworm treatment. The patient had accordingly two courses of chenopodium and carbon tetrachloride, with iron and half a pound of liver daily in addition to ordinary diet as a rule. The poor results of this usually successful treatment for ankylostomiasis induced a resurvey of the case with special regard to the ætiological significance of specific infection.

On 13th January 1931, the first fractional gastric analysis was done. Owing to an unfortunate accident the investigation could not be completed. The fasting contents consisted of about 20 c.cm. of viscid fluid with no starch or food detritus, and no free acid. Free acid was absent in the first two quarter-hourly specimens as well. On 24th January 1931, the analysis was repeated (*see* appended copy of graph A). The fasting contents were about 15 c.cm. of viscid fluid with plenty of mucus and no free acid. There was rapid emptying of the stomach and this is interesting in view of the markedly visible peristalsis. None of the quarter-hourly specimens contained free acid. Blood was sent for Kahn's test on 22nd January, and the report of the King Institute, Guindy, was "Positive, strong".



Graph B. Fractional Test Meal.

Fasting contents:—20 c.cm. of clear fluid with a moderate proportion of mucus. Free hydrochloric acid present.
Test meal:—600 c.cm. of oatmeal gruel.
Samples drawn:—Total drawn in 2¼ hours after test meal—120 c.cm. Stomach empty after 2¼ hours. Starch present throughout. Very little mucus in all samples.

Owing to persistent irregular fever, some time was lost before starting *pucca* anti-syphilitic treatment. From 26th January all other medicines were stopped, including iron and liver, and the patient was put on potassium iodide starting from 30 grains daily and reaching one drachm on 11th February, and liquor hydrargyri perchloridi, minims xc a day. Injections of novarsenobillon were given as under:—

19-2-31	.. ..	0.3 gramme.
26-2-31	.. ..	0.3 „
4-3-31	.. ..	0.3 „
11-3-31	.. ..	0.45 „
17-3-31	.. ..	0.45 „
30-3-31	.. ..	0.45 „

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Patient had only two injections of Bismostab, one cubic centimetre each on 7th March 1931 and 14th March 1931. Owing to development of stomatitis on 21st March 1931, mercury had to be discontinued from the mixture and Bismostab was not proceeded with. Potassium iodide had to be stopped too on 9th April 1931 because of iodism developing that day.

Down to 7th February 1931 visible peristalsis of the stomach was noticed. On 7th March 1931 the attention of the medical officer was drawn by the patient to the absence of visible waves of movement, and from that day visible peristalsis of the stomach could not be elicited. The patient had by then put on considerable weight and had nicely rounded off his angularities. The epitrochlear glands were not palpable. The appetite had become keen.

On 11th March the blood was sent to Guindy a second time, and the report was "Kahn's test —positive moderate, Wassermann's—positive weak". On 13th March the third test meal was given (graph B). The fasting contents were 20 c.cm. of clear fluid with a moderate proportion of mucus. Free hydrochloric acid was present. Varying but subnormal amounts of free hydrochloric acid were present in all but the first quarter-hour specimen and there was very little mucus in all samples.

Comment.

Two unfortunate omissions in investigation were the failure to do total blood-cell counts and hæmoglobin indices, and to record the weight from time to time, though on 23rd March an ordinary examination of the blood film showed no marked improvement over the smear soon after admission. Nothing was more striking than the remarkable improvement in general condition—a poor physical wreck converted in the space of about a month after the institution of anti-syphilitic treatment into a presentable figure beyond recognition.

Osler and McCrae (1926) insist for diagnosis on a positive Wassermann reaction, evidence by Roentgen rays, operation or autopsy of an anatomical lesion characteristic of syphilis, and a therapeutic test. David Smith (1930) wants in addition failure of a "try out" of recognised treatment for peptic ulcer, and a therapeutic test, including symptomatic improvement, changing serological reaction and signs of recovery on re-examination under Roentgen rays. We have no facilities yet in Tanjore for radiological diagnosis of anything but fractures of bones. As there was little in the case suggestive of peptic ulcer it was considered not worth while to operate or put the patient through non-operative treatment for peptic ulcer. The other criteria enumerated above were all present, including improving secretory functions of the stomach; but, over and above all, the disappearance of visible peristalsis of the stomach after antisyphilitic treatment offers, to my mind, incontrovertible evidence of luetic origin.

It is suggested that the visible peristalsis resulted from a luetic infiltration of the stomach wall, interfering with the normal nervous co-ordination of the pyloric sphincter with the body of the stomach. The improvement in response to the test meal would appear to imply that the original achlorhydria with mucus in all specimens was due to specific gastritis and that the inflammation subsided under appropriate treatment, as shown by the presence of free hydrochloric acid without any mucus.

Subsequent gastric analysis and blood examination were pending when the patient insisted on going home on 11th April 1931. He has since been lost sight of.

The case was discussed at a clinical meeting of the Hospital Staff Association under the chairmanship of Lieut.-Col. A. P. G. Lorimer, I.M.S., Superintendent of the Hospital, to whom I am indebted for facilities he gave me for publishing these notes. My thanks are also due to Dr. K. N. Krishnan and to my house physician, Dr. A. P. Ninan, for assistance rendered.

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Special Articles.

NON-SPECIFIC PROTEIN THERAPY.

By K. V. KRISHNAN, M.B., M.R.C.P.E., D.B. (Lond.),*
School of Tropical Medicine and Hygiene, Calcutta.

WITHIN the last few years non-specific protein therapy has been acclaimed a very valuable remedial measure. The amazingly beneficial results at times obtained by the use of this remedy in several pathological conditions have led clinicians to emphasize its value and importance. As a consequence there appears to be a growing tendency on the part of medical practitioners to recommend this method freely to all patients who have failed to react favourably to other remedies. Recent researches on the nature of the reactions following the administration of different protein substances not only lay a good deal of stress on the necessity for a judicious use of these substances in select cases alone, but also point out the disastrous nature of the results likely to follow their improper use. In the light of these evidences it appeared worth while writing this

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article on the mode of action of non-specific protein substances more from the point of view of the immunologist rather than of the clinician, and then to put forward suggestions regarding the proper method of application of this therapy.

Historical.

The first scientific observation that beneficial effects can be produced in human beings suffering from infectious diseases by treating them with injections of proteins of a non-specific nature was made about forty years ago by Bockenham. He, in 1890, reported that diphtheria serum was effective in typhoid and streptococcal infections. Pfeiffer and others confirmed this and observed that non-specific sera were useful therapeutic agents in specific infections. In 1893 Rumf reported a series of typhoid patients treated with pyocyaneus vaccine, and Romer working along similar lines noted beneficial results by the use of various bacterial vaccines on tuberculous animals. Koch and Matthes observed that tuberculous guinea-pigs reacted not only to tuberculin but also to injections of deutero-albumose. In 1894 Gilbert introduced the method of auto-sero-therapy for treatment of pleurisy with effusion. He injected small amounts of pleural exudate under the skin of patients suffering from pleurisy with beneficial effects. Zimmerman next showed that injections of peptone solution instead of the pleural exudate would yield the same beneficial results. Similar instances of successes in treatment, with purely non-specific proteins, such as Coley's fluid, the leucocyte extract of Hiss and Zinsser, auto-serum, plasma, whole blood, etc., can be found in several clinical reports of the past. But these observations having been made in an era of specificity that had witnessed the brilliant triumphs of diphtheria and tetanus anti-toxins could not be made to fit in with the prevailing mode of thought. Naturally, therefore, the claims of this new therapy were put forward half-heartedly, and its merits remained for a time unrecognised.

Coming to more modern times, the advocacy of non-specific protein therapy may be said to have started as a sequel to Wright's vaccine therapy. About 1916 Wright wrote "I confess to having shared the conviction that immunization is always strictly specific. Twenty years ago, when it was alleged before the Indian Plague Commission that anti-plague inoculation had cured eczema, gonorrhœa and other miscellaneous infections, I thought the matter undeserving of examination. I took the same view when it was reported in connection with anti-typhoid inoculation that it rendered the patients much less susceptible to malaria. Again, seven years ago, when applying anti-pneumococcus inoculation as a preventive against pneumonia in the Transvaal mines, I nourished exactly the same prejudices. But here the statistical results which were obtained in the Premier mine demonstrated that the pneumococcus inoculation had, in addition to bringing down the mortality from pneumonia by 85 per cent., reduced also the mortality from other diseases by 50 per cent. From that on we had to take up into our categories the fact that inoculation produces in addition to 'direct' also 'collateral' immunization". Reports such as this materially helped to break down the prevailing conception of rigid specificity in vaccine therapy and the scepticism regarding the value of non-specific protein substances in the treatment of disease. From hetero-bacterio-therapy, it was but a logical step to attempt the intravenous injection of bacterial components and bacterial split products, and then of protein split products of non-bacterial origin, and finally to the realisation that any substance which may be capable of inducing an "immunity reaction" on the part of the patient would result generally in the same therapeutic change. Thus, a large number of substances have been found capable of providing the non-specific stimuli for the "immunity mechanism", and it will not be out of place to give a list of them here.

Substances used in "non-specific protein therapy"

1. *Blood and blood sera.*
   Normal sera—human, horse, sheep, beef, goat, and chicken sera.
   Immune sera—human convalescent sera (measles, poliomyelitis, etc.), pneumococcus, streptococcus and dysentery sera, diphtheria and tetanus anti-toxins.
   Whole blood—human.
   Related agents—blister fluid, pleural and ascitic fluids, cerebro-spinal fluid.
2. *Proteins.*
   Egg albumen, seralbumin, milk, casein, gelatin, agar, and other plant proteins.
3. *Protein split products.*
   Proteoses, deutero-albumose and Witte's peptone.
4. *Enzymes.*
   Trypsin, amylopsin and leucocytic extracts.
5. *Tissue extracts.*
   Tumour autolysates, vascular and muscle extracts.
6. *Vaccines.*
   Practically all vaccines. T. A. B. and *B. coli* vaccines in particular.
7. *Bacterial extracts.*
   Tuberculin, Coley's fluid, and Phylacogens.
8. *Colloidal metals.*
   Gold, silver, manganese, sulphur, iron, platinum, mercury and antimony.
9. *Miscellaneous.*
   Hyper- and hypo-tonic salt solution, distilled water, turpentine, and glucose solution.

It will be noticed that in the above list a number of non-protein substances are also

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included. The therapeutic effects of these, though variously explained previously, are now recognised to belong to the same category. All the substances included in the list act as non-specific stimuli to the normal immunity mechanism and help to produce the anamnestic and other reactions on which probably their beneficial effects depend. The anamnestic reaction, as is known, is one in which an increase in the concentration of an antibody is brought about by the non-specific stimulus of a substance which can possibly have no chemical relation with the antigen that reacts in the test tube with the antibody that has increased.

Diseases in which non-specific protein therapy has been applied.

1. Arthritis—all kinds, acute, rheumatic, chronic, gonorrhœal and syphilitic.
2. Typhoid and paratyphoid fevers.
3. Gonorrhœa and its complications.
4. Acute infectious diseases:—anthrax, diphtheria, bacillary dysentery, erysepelas, measles, pneumonia, septicæmia, scarlet fever, tetanus and poliomyelitis.
5. Miscellaneous diseases—asthma, hay fever, urticaria and hæmorrhagic diathesis, splenic enlargements, etc.
6. Nervous diseases—tabes, general paralysis of the insane, epilepsy, subacute combined degeneration, certain forms of neuritis and neuralgias.
7. Skin diseases—psoriasis, eczema, acne and furunculosis.
8. Eye diseases—trachoma.

Mode of action.

The reactions that follow injections of various protein substances into man may be considered under two heads, *i.e.*, clinical and immunological.

Clinical.—The reaction as observed by the clinician may vary from a mild febrile attack to extreme shock associated with profound vasomotor paralysis—the degree being dependent upon the nature of the substance used, its dosage, method of application and rate of absorption, the type of infection of the patient, the tissue involved in the disease process, the physical condition and temperature of the patient at the time of injection and so on. For purposes of description, however, a typical reaction as generally observed by the clinician may be described as follows. It usually starts with a slight chill, rise of temperature, rapid pulse, nausea, vomiting, headache, etc. There may be a slight fall in blood pressure after an initial rise. These may be followed by increased glandular activity, sweating and diarrhœa. Local pain, swelling, redness and heat at the site of inoculation may be complained of. There may be a lighting up of infection irrespective of its nature with aggravation of symptoms. All these may gradually subside leaving the patient in a clinically improved state.

Immunological.—The immunological changes noticed in the blood and blood forming organs on the other hand are very variable and uncertain. The results obtained by different workers, both in man and experimental animals, are not concurrent and do not warrant any definite conclusions. However, excluding for the time being observations such as increase in the permeability of capillaries, increase in the rate of flow of lymph, in the number of red blood corpuscles, blood platelets, and increase in enzyme activity whose significance it is difficult to assess, one may consider the more important immunological changes that are recognised to have a bearing on the value of non-specific protein substances as therapeutic agents. These may be discussed under the following two headings.

(1) *Leucocytic changes.*

Leucocytic changes have been noticed from the very commencement of this therapy. In the great majority of cases the reaction consists of two distinct stages—a primary stage of leucopenia and a secondary stage of leucocytosis. Spekorovoskapa (1925) found that in 80 per cent. of the cases there was an initial leucopenia lasting for about three days. From the third to the seventh day there occurred a moderate increase in leucocytes which again went back to normal. Weichardt and others found that the leucopenia lasts only a few hours and that the rise in leucocytes commences after 8 to 10 hours and in 1 to 2 days there is hyper-leucocytosis which may last from 3 to 5 days. The writer, who has had ample opportunities to note in connection with certain of his studies on the cellular mechanism of defence, the nature and degree of leucocytic response in experimental animals after intravenous injections of various protein and colloidal substances, found that the nature, degree and duration of leucocytosis were all dependent upon a variety of factors such as the chemical nature and the physical state of the protein, the route of administration, the dosage, the condition of the host and his immunity mechanism and so on. On the whole, in his experience the initial leucopenia was generally of short duration (1 to 2 hours) and was followed within a few hours by leucocytosis which lasted for a few days (3 to 4 days).

Regarding the type of cell that is responsible for the production of leucocytosis there appears to be some difference of opinion. While some find an increase in the granular series of leucocytes, others find an increase in the non-granular series. Ling (1925) found that after injections of proteins like milk, peptone and typhoid vaccine there was an increase in neutrophils and after injections of distilled water and many other non-protein substances, there was an increase in the

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mononuclears. As already pointed out there is some sort of relationship between the chemical nature of the substances introduced and the type of leucocytic response obtained. In the writer's experience, however, the type of leucocytic response was fundamentally the same in all cases. The period of leucocytosis invariably consisted of three stages, the early stage was due to increase in polynuclears, the middle to increase in polynuclears and large mononuclears and the late to increase in large mononuclears. The degree and duration of these stages varied enormously not only with the substance introduced but also with the condition of the host and his immunity mechanism, nature of his illness and the mechanism of its cure, etc. Our knowledge of these factors at present is poor and only when more information is available would it be possible to choose such substances for injection as would yield a leucocytic response most helpful to the patient. The best results will then be obtained in those diseased states where the mechanism of cure is a cellular one.

(2) *Antibody changes.*

It has long been noticed that if injections of non-specific protein substances are made into persons who have been previously immunized, these will respond with an increase in the titre of antibody already present in their serum. Although this is by no means a constant affair, a good deal of stress has been laid on its being the main factor responsible for the beneficial effects noticed in patients after injections of non-specific protein substances. It will, therefore, be necessary to record here some of the more important experimental evidence available on the subject.

Using *peptone and other protein materials,* Obermayer and Pick (1904), Fleckseder (1916), Weichardt and Schrader (1919), Matsuda (1924), Ling (1925) and Buzello (1926), all noted an increase in the titre of antibody.

Next, using milk, Uddgren and others reported that indistinct Wassermann and Widal reactions became distinct, and gonorrheal patients previously giving a negative complement fixation reaction gave a positive reaction.

Using one *vaccine* as a primary specific stimulus and another as a secondary non-specific stimulus Dreyer and Walker (1909), Conradi and Beiling (1916), Tsukahara (1921) and Rosher (1924) all noted an increase in titre of antibody for the primary antigen.

Using various *colloids* such as agar, gelatin, silver solution and iron solution, Steaben (1925) found that they had no power to increase antibody titre when this had become steady, but that when they were given at the same time as the bacterial antigen, they appeared to increase the antibody response.

Using various *metallic* salts of manganese, cobalt, beryllium, etc., Walbum, Madsen, Schmidt and their colleagues (1924-25) noted that these caused increased production of antitoxins, agglutinins, etc.; but McIntosh Horgan and others failed to confirm their findings.

Topley (1929) after weighing the evidence contained in all the available literature on the subject, summarises the results as follows:—

1. Non-specific stimuli cannot cause the appearance *de novo* of any of the known serum antibodies.
2. They may cause an increase in any of the normal antibodies present.
3. They may cause an increased production of immune antibodies when administered during the early stages of immunisation.
4. They may cause a secondary rise in titre when administered after the effect of the preliminary specific immunisation has begun to decline.
5. All the above responses are exceedingly irregular, usually trivial, and never comparable to those following the re-injection of the specific antigen.

In view of the above conclusions it is hard to decide what the true value and significance of the increased antibody output can be. Beneficial results have often been recorded in the absence of any increase in the demonstrable antibody. It seems therefore probable that increased antibody output whenever it occurs only plays a subordinate rôle. In those types of infection where the principal mechanism of cure is an antibody mechanism, increased output of antibody will certainly be helpful; but this, as rightly pointed out by Topley, can be better brought about by the use of specific antigens.

The mechanism of cure.

It has been shown that serological, cellular and other changes occur after injections of non-specific protein substances. To which of these the beneficial effects obtained are attributable, it is rather difficult to say at present. However, the theories that have been put forward from time to time by various people to explain their results are given below.

Weichardt (1919-1920) assumes that the non-specific agents instead of attacking the pathological cause, as do the specific agents, aim at altering the "reactivity of the soil." All the cells of the organism are said to be stimulated to greater activity with consequent production of substances increasing the "general resistance" and speeding up the "mechanism of detoxication." The process is assumed to be a physiological rather than a pharmacological one.

Döllken (1919) assumes that non-specific stimulation is not 'omnicellular' as suggested by Weichardt, but that certain organs alone, such as the liver, spleen and bone marrow, are stimulated to greater activity with the result that the immune processes work most efficiently.

Larson thinks that injections of foreign proteins liberate the so-called sessile antibodies previously fixed in the tissues, and get them

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into the circulation so as to be readily available at the focus of disease.

Uhlmann supposes that in addition to the increased production of antibody, complement, etc., "the sympathetic nervous system plays a very important part."

Finally, there are some who are of opinion that proteins act by enhancing the activity of the endocrine glands.

From the different views quoted above it will be evident that our knowledge regarding the mechanism of cure is still very vague. It appears to the writer that the beneficial effects are attributable not to one but to a combination of factors, for often striking clinical results have been obtained quite independent of any of the changes recorded above. He therefore ventures to suggest that the therapeutic results may be attributable to the stimulation of tissues, such as the reticulo-endothelial tissues which are supposed to be concerned in the efficient working of the immunity mechanism, whatever its nature may be.

Practical application.

When one goes through the mass of literature on the practical application of non-specific protein therapy, one is struck by the great variability and inconsistency of the results obtained. It is quite as common to find reports of amazing successes as it is to find reports of disastrous results. This is not at all surprising when one remembers that not only is our knowledge of the mode of action of this therapy vague and imperfect, but also that there are no fixed standards regarding the choice of protein, dosage, interval between injections and so on. Furthermore, at present it is not possible to lay down any general hard and fast rule for the guidance of practitioners. Factors, such as age of the patient, and nature, duration and type of his illness, have all to be carefully weighed before deciding what particular substance or dose would benefit the patient most. However, the following tentative suggestions may be considered with profit.

Choice of protein.—Although it is recognised that all non-specific protein substances produce reactions fundamentally alike, it would be presumptuous to say that the choice of the protein is not a matter of very great importance. While it is a fact that in certain cases quite simple proteins produce as good results as highly specialised protein substances, it is not to be supposed that this would work in all cases. For instance, for intravenous injections protein split products seem to be more satisfactory than vaccines; where mild reactions are desired sera appear to be more useful; where more severe general reactions are indicated intramuscular injections of boiled, market milk will be found excellent; and in septic infections the colloidal metals seem preferable. The correct choice of the protein, therefore, appears to be of no mean importance.

Dosage.—This undoubtedly is a very important matter on which the success or failure of the therapy depends to a large extent. What exactly is the correct dose and how to determine it for each patient, are things dependent upon a number of factors. Theoretically it is only possible to suggest that good results may follow small gradually increasing doses at suitable intervals. Apart from this general rule the dose for each case should be judged on its own merits. For example, in young children, in acute illness and when the route of administration is intravenous, the dose should be relatively smaller. When the focus of disease is situated in sensitive tissues like those of the lung or brain one has to be particularly careful about the dose. In chronic diseases of adults involving tissues, such as those of joints, bones and skin, an excessive dosage may not prove dangerous. The best guide to correct treatment is the patient himself. The right dose will always cause the greatest clinical benefit, even after the very first injection.

Focal reaction.—Weichsel, who is a great protagonist of this therapy, is of opinion that the reaction that follows an injection when carefully studied and properly interpreted constitutes an excellent guide to further treatment. He thinks that a focal reaction is desirable, but not a strong one. The best results are usually obtained when the focal reaction is slight.

Temperature.—This should rise but slightly, and the fever last for a short time only. A high rise in temperature lasting for a long time does harm in most cases.

Leucocytic curve.—The focal reaction and temperature follow very closely the leucocytic curve and, therefore, it may be considered the best indication of the ability of the person to react to the foreign stimulus. It will indicate definitely if the stimulus is acting favourably or not. Very strong stimuli produce long continued leucopenia followed by hyper-leucocytosis, both of which are generally undesirable. Well-balanced stimuli on the other hand produce an initial mild short-lived leucopenia, which is quickly followed by a definite but not enormous increase of leucocytes. The degree of leucopenia and leucocytosis are not in every case of the same significance. For instance in a chronic disease like arthritis, it is the chill, the high temperature, the severity of the reaction and the hyper-leucocytosis that appear to be beneficial; whereas in a disease like asthma or typhoid fever such a reaction would be disastrous.

Before concluding this section it seems necessary to point out that there are certain contra-indications for the use of this therapy. A few are definitely known and a great many have yet to be revealed. The more serious contra-indications according to Petersen are extreme physical depression, history of serum sickness,

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hypersensitiveness, severe nervous diseases, alcoholism, diabetes and pregnancy.

Conclusions.

From the preceding pages it will be evident that our knowledge regarding the mode of action and value of non-specific protein therapy is still vague and imperfect. Under the circumstances it is but fair to suggest that it should not be applied either as a routine measure or in unselected cases. Great caution is desirable at least until more information is at hand regarding the correct method of its application. Furthermore, it is necessary to realise that at best this therapy is but a poor method of stimulating for short periods the immunity mechanism of the body, and as such would be useless if overdone or applied when the mechanism is in a state of intense depression. Perhaps there is no better way of concluding this paper than by quoting Petersen who writes "Needless to say, non-specific therapy does require judgment, careful attention and bedside study on the part of the physician, perhaps in greater measure than any other therapeutic procedure. It should never be a routine; to be useful it must be an individualized therapy, with dosage and preparation and time of application varied to the disease, its intensity, its duration and the resistance of the patient."

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THE USE OF FORCEPS IN ENGLAND, TWO HUNDRED YEARS AGO.*

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IT appears from two books published in London during the first half of the 18th century and containing records of obstetric cases in the practice of two obstetricians, Giffard and Chapman, between the years 1710 or earlier and 1735, that the use of forceps was well known at that time. From the details recorded, it is also possible to find the conditions under which forceps had been used and with what result.

William Giffard's book "Cases in Midwifery" was revised and published by Edward Hody in 1734; it contains an accurate and impartial account of the deliveries of 225 women, in 35 of which he used his extractor (*i.e.*, forceps). In all these cases dates are given. The forceps was employed between April 8th, 1726, and July 12th, 1731.

Edmund Chapman's book, which was published at first only as an essay, appeared as a complete treatise in 1735. This book, "*A Treatise on the Improvement of Midwifery, chiefly with regard to the Operation*", contained detailed descriptions of 57 cases selected from upwards of 22 years' practice. Forceps had been used in four of these cases. No date is given in the first case, but the other three occurred in 1733 and 1734.

Frequency of application.—Giffard employed forceps in the 35 cases in about 5 years (*i.e.*, between April 8th, 1726, and July 12th, 1731). It is to be noted that apparently Giffard used the forceps for the first time in a case on April 8th, 1726, "but was not able to fix it, the parts giving way....." and the head had to be perforated. The next case, in which Giffard used his extractor, was on June 28th, 1728, and he used it successfully. He used his forceps seven times in 1728, seven times in 1729, eleven times in 1730 and nine times in 1731. Giffard used forceps more frequently with increased experience, using it four times in the course of eleven days in June 1731.

Chapman employed it four times altogether, three cases occurring in two years, one in 1733 and two in 1734. In describing his last case Chapman says "I could produce about thirty instances more of the same operation performed in this town....."

Presentation.—Of Giffard's 35 cases, 34 presented by the "head" and one by the face. Of the 34 cases presenting by the "head", in 24 it was simply mentioned "head", in three "back part of the head", in one, "fore-part of the head", in two "crown of the head", in two "head transverse" and in two "head and funis". In 14 of these it was stated that the "head stuck in the passage". In four, out of the total 35 cases, forceps failed to deliver the head, and delivery had to be completed by craniotomy in three cases, and by version in one case where the head was high.

Chapman's four cases presented by the head; in two, the "face towards the os pubis". Of the two latter cases, in one the "pains were strong" and in the other, "pulse began to sink and her pains falling off a little". In the other two, the pains began to abate in one of these, the patient was "much weakened and fatigued".

It will be seen that forceps were employed in all these cases to catch hold of the *fore-coming head.*

Indications and complications.

1. Head sticking in the passage.
2. Face towards pubis.

* Being a paper read at the July 1931 meeting of the Calcutta branch of the British Medical Association.

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3. Eclampsia.
4. Cicatricial contraction of the vagina.
5. Pains weak.
6. Head transverse.
7. Head and funis (prolapse of).
8. Contracted pelvis.
9. Head high.

Mode of application of forceps.—The following description is reproduced from Chapman's treatise.

"This instrument though not pointed must yet be used with caution. You are first to pass one part thereof above, gently introducing it and guarding and directing the bow as far as you can with all the fingers of the left hand (the instrument lying in the hollow of the hand), being careful that no fold or part of the vagina get between the instrument and the head of the child which would at once hinder any hold of the head (and consequently foil you in the attempt) and bruise the part that intervenes. But a little care will easily prevent this.

"One part thus passed over the head and under the *os* pubis, the other is to be passed over the *os* sacrum and thus a laceration will be avoided. When these are passed, they are then to be brought close together and if you please, the screw may be put through and fastened with the button, though there is no occasion for the loss of so much time; for without doing this, the hand will prove sufficient to keep them together, and thus you may extract the head by drawing gently down.

"It is much better as I have just observed, that the two parts of the forceps should not be joined or fixed by a screw, the hand being sufficient and that for these reasons. First because when they are screwed together though they should not happen to be exactly opposite to each other, yet they will turn so as to take fast hold of the infant's head and readily extract it. Secondly, in case if one of the parts should slip, it is then easily returned to its proper post without being taken wholly away: whereas when they are screwed together and then slip off on one side (which I have often experienced in spite of the greatest care I could use) the instrument is to be repassed and screwed as at first. They have often times slipped and when I expected the head of the child, I have been deceived and found the handle part come close, the instrument only in my hands, and the work all to do over again.

"I have always found the instrument far less apt to slip since I omitted fastening the parts together, and with more ease to the patient as well as myself and in much less time than before, have found the head of the child fairly fixed in the instrument; that is between the two parts or bows: so that in a few seconds of a minute I have had the child's head with the instrument, after which little or no difficulty remains. Thus have I delivered several women since my coming to town some of whom you will find mentioned in the cases at the end of this treatise; and Mr. Giffard in case XIV and elsewhere frequently complains that his extractor slipped, which I am fully persuaded it would not have done, if the parts had been left unjoined, as I now use them.

"I do ingenuously confess that I came by this hint and improvement by mere accident as I believe is frequently the case in discoveries of the greatest importance".

The status of forceps at that period may be realized from the following extracts from Giffard's and Chapman's books.

Giffard's book is a record of obstetric cases. He, however, offered comments on some of them. In his comments on those in which he employed forceps, he emphasizes the fact that "the head when sticking in the passage and not able to pass by the force of pains, may by a proper instrument, be brought out, without destroying the child, without the pernicious use of hooks". He also realized that when "the passage.....was much straightened by the upper part of the *os* sacrum, being bent very much inwards" the operation was very difficult.

The following remarks of the author show that he believed that the head could be compressed to an appreciable extent by forceps, so as to facilitate delivery.

"By the right use of a proper instrument the head, when stuck in the passage, and not able to pass, may be brought out whole, without lessening it, nay, very often without loss of life to the child; for the head will mould almost into any form, like wax, whilst the parts are so tender".

The following quotations show how in a primipara after forceps failed delivery was completed by version. "The woman was very impatient and urged me very strenuously to deliver her; by her entreaties I was induced to attempt the delivery, though it was contrary to my own judgment. I thereupon passed up one part of my *Extractor* on one side of the head, and then endeavoured to pass the other on the contrary side, in hopes to have fixed them so, that I might have been able to draw out the head, but the head not being fixed between the bones of the pelvis gave way upon my pressing upon the instrument, and returned backwards into the uterus, wherefore I immediately passed up my hand into the uterus and as the head did not stop up the passage, I readily passed my hand by its side and soon met with one leg, which I drew forwards".

It is evident that Giffard realized that he should not have attempted to deliver the woman at that stage. The failure of the forceps to catch hold of the head properly was due to the fact that the head was high up and the instrument was too short to be introduced far enough in to obtain a good hold of the head.

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Giffard's comments are pertinent. "If the passage is large the child small, the head not engaged in the pelvis and the woman has been delivered before you may safely.....attempt the delivery", by version.

Chapman's treatise is more comprehensive and contains definite instructions and observations which are of great importance. The following quotations will reveal the intrinsic value of work.

Chapman in the preface of his treatise declared thus:—

"As all the books hitherto published on this subject have been calculated chiefly for the instruction of my own sex, I was induced to write this *Treatise* principally for the use of the other". Further on he says "I have studiously declined giving any *Prescriptions* or *Forms of Medicines*.....I think it sufficient for one man to act well in one capacity; and I have confined myself to the *Operation* of Midwifery only,....." He goes on to say, "The use of hooks and some other instruments by which living children presenting with the head are destroyed, when they might very easily have been extracted in a few minutes by the Fillet or Forceps is in my opinion a most cruel and unwarrantable practice". Chapman then declares his preference for forceps and states—

"How necessary is it then, that men who profess midwifery should make themselves masters of either the Forceps or Fillet..... the former of which I prefer because I can pass it with more ease to the woman; and the compression caused by its use, makes the bones of the head ride one over the other and thus reduces it to a smaller compass. To which may be added, that the Forceps gives me a much stronger hold of the child and enables me to draw it with more ease and security. But here I must observe that as there are several different sorts of forceps, so they are far from being all equally proper; and great regard is to be had to their form. I once saw a pair at a noted instrument-maker's which I thought very faulty; and was shown a pair by a brother practitioner in the country which could not be used with either success or advantage; the diameter of the curve being too large and its bows too short".

Referring to Dr. John Mowbray's book "The Female Physician" in which that author strongly declared against the use of frightful instruments, Dr. Chapman, while heartily joining him, rightly observed that the forceps did not deserve that appellation. Dr. Mowbray was evidently not aware of the use of forceps.

"The chief books on this subject extant in our language are Dr. Chamberlen's Translation of Mauriceau and the translations of Dionis, Daventer, etc.".

"The secret mentioned by Dr. Chamberlen, by which his father, two brothers and himself saved such children as presented by the head but could not be born by natural pains, was as is generally believed, if not past all dispute, the use of forceps, now well known to all the principal men of the profession both in town and country".

Commenting on Hugh Chamberlen's statement "that it is not necessary to those practitioners, who can fetch a child coming right or with the arm, without hooks or sharp instruments; as the translator of this book, his father and brothers can", Chapman says—

"Here is something very odd methinks, in applying this secret to both these cases, as equally serviceable in either; the cases differing so very widely and requiring a quite different method: for the head presenting and far advanced, is to be taken hold of either by the Forceps or Fillet and by them extracted; whereas a child which presents an arm, is to be turned and so brought away by its feet".

"Daventer sets out with the specious pretence of performing all by the hand only and professes in no case to use an instrument. This he all along carries on, till at length in the Appendix he tells us that if the pelvis be proportionately too small for the child or if the head of the infant falls down into the narrow cavity of the pelvis and is straightened along with the shoulders, that the least descent is perceived upon the force of the strongest pains and all remedies have been tried in vain for the safety of the mother, the infant is to be handled and drawn out as a dead one". Chapman comments thus—

"This indeed is a case which very rarely happens and almost the only one that requires an instrument though even here the head may for the most part be commanded by the forceps, of which he does not give the least hint".

"It shall be my endeavour in the following pages to prove that most births may be performed without instruments, by the assistance of the hand only; or when instruments are really required by the help of the forceps or fillet, which are not only perfectly safe and innocent but extremely *useful* and in some cases *absolutely necessary*".

"Method of saving a child whose head presents and lies fixed in the pelvis and must of necessity be born that way.....This can be done but two ways, *viz*, either by slipping a fillet over the head in such a manner as to extract the child thereby, or by taking hold of the head with forceps. It is to be observed that neither of these can be used if the head does not lie very low nor is their use to be otherwise attempted".

"As to the forceps which I think no person has yet any more than barely mentioned, it is a noble instrument,....."

Chapman then gives detailed directions for the application of forceps which have been quoted above.

"For many years my forceps happened to be made of so soft a metal as to bend or give

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way or suffer some alteration in their curve. They were made as usual with the screw fixed to one part or side of them. These I used for some years; but they often happening to slip off sideways, my opinion of the instrument was so much lessened that for many years after I used it but seldom and even not once in the space of ten years..... At length I caused another pair to be made me of better metal and some other improvements, the screw part being contrived to take out and not fixed as in the former. This screw I happened to lose in the cloths at the delivery of a woman..... and being sent for to another presently after, and being indeed forced to make the trial, found that the instrument did its office much better without the screw or the two parts being fixed".

"All I can say in praise of this noble instrument must necessarily fall short of what it justly demands. Those only who have used it and experienced the excellency of it, to their own advantage and the security of their offspring, can be truly sensible of its real worth".

Chapman quotes a letter dated October 30th, 1734, from a Dr. John Page, a country practitioner, who informs him that he used the forceps for the first time in a case, and acknowledging his indebtedness to him for teaching him the use of forceps.

"And here I can not forbear testifying an uncommon surprise at Dr. Mowbray's method of treating this admirable instrument, which he takes the liberty of representing as a barbarous invention for *sacrificing the child* in order to save the mother's life (Sect. V, Chap. XIX), and ranks it with the hook and other really barbarous tools calculated for extracting the infant, dead or alive, whole or in pieces. His pathetical exclamations, which make so pretty a figure on this occasion, might have been spared, had he been acquainted with the true manner of using the forceps. I am not afraid to say he was really ignorant in this particular, when I find him talking of *braining the child and then drawing it forth* with the forceps; whereas it is evident from the directions here laid down for its application, that it is to compress the parts of the head so as to extract the infant with ease and safety and that no use can be made of it when *the child is brained*, as he elegantly words it; but that when it can be introduced, it effectually prevents that dismal accident.

"The same gentleman is pleased to declare elsewhere (Sect. V, Chap. XXVI) against all instruments in general 'in all conditions of births, whether *natural or preternatural, dead or alive*' and declares that 'in all cases the hand is solely obliged and only best serves, according to the rules of his profession, to discharge the duty of all the instruments in the surgeon's shop; excepting only in the case of a monster or a very hydropsical child'. But I do not apprehend that anything advanced by this author against that excellent instrument here recommended, will be allowed much weight to its prejudice; since as it appears he was unacquainted with the true use of it.

"I must acknowledge myself short in not giving the figure of my forceps in the former edition. I was not indeed so thoroughly sensible of this defect till I found my essay honourably mentioned by a learned society established at Edinburgh for the improvement of Physic and Surgery, in the Medical Essays and Observations, etc., Vol. III, Art. XXXI. As these gentlemen by saying I have not given a description of that instrument as I used it, seem to insinuate that something is wanting to render this work more complete and satisfactory; I have now subjoined an exact draught of my forceps, which is very little different from that used by the late Mr. William Giffard, and which I apprehend too of a make preferable to those represented, Table V of the *Medical Essays*, etc., as taking better hold of the child's head than can be done by an instrument whose *curves* are broad and not divided and formed into a sort of a ring as in the figure here exhibited, in which the most protruberant parts of the head lie naked, whereas in the *extractors* last mentioned the whole is covered and the instrument of course takes up more room".

Chapman concludes this chapter with some remarks on the use of the crotchet and the blunt hook. Chapter II treats "of the method of turning a child". Chapter III "of the Placenta or After-Birth", chapter IV "of Flooding", and chapter V contains "a variety of cases which illustrate and confirm the methods above laid down." The cases in which forceps had been used have already been attended to. The concluding portion contains (*a*) a description of the pessary used in the case of a prolapsus uteri, (*b*) a case illustrating a complication from the use of a pessary, (*c*) a description of how a woman is to be treated after a hard labour, (*d*) the author's method recommended by Guilleneau, and unjustly censured by Dionis, (*e*) success of first edition of this book, (*f*) advice to junior practitioners and women midwives, and (*g*) the author's profession not to direct his superiors or censure any one.

RURAL HEALTH WORK IN TRAVANCORE STATE, SOUTH INDIA.

By N. KRISHNAN TAMPI, M.B., B.S., B.S.SC. (Mad.), DT.P.H. (Johns Hopkins),
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THE great majority of our population live in villages and rural areas, beyond the reach of organised public-health work. Except for the irregular visits of the vaccination staff and an occasional glimpse of a medical squad in times of an unusually severe outbreak of cholera or plague, the people of a rural area do not see

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or know anything of the public health department. Conditions are not much better even in those provinces of India where a new health scheme has come into operation. With the rapidly increasing population and with better means of communication, it is no wonder therefore that epidemic diseases sweep over the country whenever climatic conditions are favourable, and chronic infections spread rapidly, sapping the vitality of the race. Public-health conditions in Travancore were also in this state until the Government, after a bitter experience of a severe epidemic of cholera in 1928, decided to reorganise public-health work. The Rockefeller Foundation was approached for assistance in this reorganisation, and Dr. W. P. Jacocks who was deputed by the Foundation made a preliminary survey of the health conditions of the State and submitted his scheme for a public-health organisation in May 1929.

This scheme included separate bureaux for statistics, epidemiology and sanitary engineering and a public-health laboratory at the head-quarters, as well as the organisation of health units in the rural areas of the State, for taking up intensive public-health work. Government sanctioned one such unit as an experimental measure and the first health unit in the State was started on 15th May, 1931, at Neyyattinkara, 12 miles south of Trivandrum. As this health unit represents the type on which it is proposed to develop rural-health work in the State and as it carries out a programme which in many respects is unique in the whole of India as far as rural health work is concerned, the following note on its working has been prepared for the information of all who are interested in the development of public-health work in India.

Description of the Health Unit.

The Neyyattinkara Health Unit includes at present an area of 28.22 square miles with a population of 39,580. The entire area is rural except for the two small towns with a population of 9,000 and 5,000 respectively, which are included in the Unit. As soon as work is well organised in this area the Unit will be extended to include three more revenue subdivisions extending its area to 50.55 square miles and its population to 98,286. This extension will involve only an increase of three sanitary inspectors and three midwives to the staff at present employed. The full Unit will include a big rural population, a fishing population along villages on the sea coast, and an urban population included in the two small towns. Except for a small staff of sweepers in the two towns and vaccinators, this area has not previously been the scene of any public-health activities. There are no reliable statistical data available, as registration of births and deaths as carried on by the Revenue Department is very unsatisfactory; but there is sufficient evidence that except in the big towns death rates and infant-mortality rates are lower than in the rest of India due mostly to the system of housing. The rural population is not aggregated into villages except in a few areas, but is spread evenly over the whole country each house being surrounded by its own fields and gardens. The land is fertile, is traversed by one river and a few streams and is full of rice fields, cocoanut groves, plantations of tapioca and bananas. There are plenty of schools and the general level of education is high both among boys and girls. Medical relief is comparatively satisfactory there being a government hospital at the head-quarters of the Unit, and a dispensary at another place within the Unit, ten miles away from the hospital. There are numerous Ayurvedic and homœopathic practitioners, mostly with very questionable training or qualifications, who manage to make a living by working on the credulity of the poor people. These do more harm than good. There is however no means of controlling their activities in the absence of a medical registration act in the State.

Staff of the Health Unit.

The staff of the Neyyattinkara Health Unit consists of one medical officer of health, one assistant surgeon, two lady sub-assistant surgeons with special training in public-health nursing, three sanitary inspectors, three midwives, one clerk and two peons. This staff will be increased by three more sanitary inspectors and three more midwives when the whole area of the Unit is taken up. There is in addition a small staff of one sanitary inspector and one midwife along with the menial staff for conservancy work, who are paid by the municipality included in the Health Unit but who are under the control of the medical officer of health of the Unit.

Health survey.

The first activity of the Unit was to carry out a detailed house-to-house health survey in order to define the public-health problems requiring attention and also to provide accurate vital statistics data for the preceding year. This was necessary as the existing vital statistics data were considered unreliable. A health survey card was accordingly designed for gathering information from each house with regard to the names and number of occupants, their age, sex, religion, vaccinated state, housing conditions, latrine acommodation, water supply, the births, deaths, pregnancies, abortions, etc., during the preceding year, the existence of cattle sheds, pig sties, etc., the average income of the family, and the length of their residence in the locality. All the 6,244 occupied houses in the Health-Unit area were visited by the sanitary inspectors and a health card was filled in for each house. The four sanitary inspectors together took three and a half months for the

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work. The results of the survey have since been analysed and have yielded some very useful and interesting information. The following table gives the birth, death and infant mortality rates for the various divisions of the Health Unit as obtained by the survey and compared to those registered by the Revenue authorities. The figures relate to Malabar year 1106 (1930-31).

in the municipal town in the Health Unit. With regard to latrines the health survey showed that out of 6,244 houses only 177 had any latrine arrangement. Of these 173 were in the municipal town. All these were pit latrines. With regard to water supply out of the 6,244 houses only 30 houses have built or protected wells. Two thousand three hundred and seven houses had no drinking water supplies

TABLE.

Health Unit—Vital Statistics.

Division.	Population.		Birth rate.		Death rate.		Infant mortality rate.	
	Census of 1931.	Health survey.	Census.	H. S.	Census.	H. S.	Census.	H. S.
Neyyattinkara Municipal Town.	9,263	9,128	13.6	40.37	7.88	12.1	39.68	101.6
Balaramapuram Conservancy Town.	5,376	5,243	29.6	34.8	18.78	21.02	207.5	165.77
Neyyattinkara Pakuthy	12,203	12,198	9.83	36.4	4.67	16.7	50.00	94.6
Athiyannur Pakuthy ..	13,038	12,799	14.9	37.96	5.9	14.1	107.7	78.18

The above table shows the very unsatisfactory state of vital statistics registration at present in Travancore. It is also, however, necessary to recognise that the general death rates and the infant-mortality rates are decidedly lower in the Travancore State except in a few areas. One of the chief factors for this is the type of housing. The State of Travancore is one of the most densely populated areas in India. The average density in the rural areas of the Health Unit is 1,400 per square mile. This population is not aggregated into villages, but spread wide over the entire area, each house or hut being surrounded by its own fields and gardens. This distribution of population is responsible for the decidedly lower infant-mortality rates, than those which occur in other parts of India. In some parts of Travancore where the housing conditions are similar to those in other parts of south India, and where aggregation of population into village groups is common, the prevailing rates of infant mortality and general mortality are on a par with the rest of south India. Such areas are, however, becoming more and more common in different parts of the State and require special attention. The other aspects of the findings of the health survey will be discussed in subsequent paragraphs along with the different activities of the Health-Unit.

Sanitation.

In appearance, as well as in the sanitary facilities offered, the entire Health-Unit area may be considered as rural in character. The chief problems in sanitation are the provision of latrines, the improvement of water supplies, and arrangements for the removal of night-soil

at all of their own, but depended upon wells in neighbouring houses, all of which were mere dug wells, often without a full parapet wall and open to contamination. Eight hundred and twenty-two families were utilising the raw water of the rivers and streams for drinking purposes. With the system of housing common in this country, public latrines and public water supplies are out of the question except in the dense urban areas. An educative campaign for the improvement of existing wells and the introduction of a latrine for each house has therefore been undertaken. The type of latrine recommended is the bored-hole latrine. The holes are 18 inches in diameter and are 25 to 30 feet in depth and are bored by means of a machine. The soil is heaped up at the top and a reinforced concrete slab 2½ feet by 3 feet with a central opening, a dished surface and foot-rests on either side of the opening is placed over the hole. Arrangements have been made to provide demonstration latrines of this type in different parts of the Health Unit and to encourage its adoption in the rural areas. One such hole will last 1½ to 2 years for an ordinary family. When the hole is almost full it can be covered with earth for the top one foot or more, and the slab removed to a new hole bored near by. The third hole can be bored in the site of the first hole making boring easy and making available the valuable contents of the hole as manure. With regard to water supplies the campaign of education is for preventing the use of raw river water and for the improvement of existing wells by the erection of parapet walls, cement lining, cement platform and cement drain around, and the provision as far as possible of a safe well for every home or group of homes.

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Hookworm treatment.

The health survey showed that hookworm was very common. Eight hundred and five samples of fæces examined in 1930 from this area showed an infection rate of 94.2 per cent. and an average egg count of 613 per gramme of fæces. A mass treatment for hookworm was carried out by the hookworm treatment party for one month in different parts of this taluk in May 1931. Hookworm treatment is given every Saturday morning at the office of the Health Unit; the sanitary inspectors and the school medical officer direct suitable cases to this place.

Smallpox vaccination.

In spite of a severe epidemic of smallpox in the preceding year when large numbers of people were vaccinated, the protection from vaccination in the Health-Unit area is far from satisfactory. The health survey shows that there are 6,463 persons in the Health-Unit area who are not protected by primary vaccination, which works out to a little more than one unprotected person per house. There is no wonder therefore that the epidemic of smallpox which began last year has not subsided. An intensive programme of vaccination has just been started by which it is expected to clear this unprotected list and also do a sufficient number of revaccinations. Vaccination in the Health-Unit area is done by the sanitary inspectors and the lady sub-assistant surgeons, as it has been felt that vaccination work as done by the existing vaccinators is unsafe and unsatisfactory. One of the reasons why vaccination is unpopular is that it has been entrusted to persons who are not particular about asepsis, especially when working in the rural areas, and whose low qualification and training places them only slightly above peons in status. With a better type of personnel for vaccination work, with better equipment and a steady educational campaign it is expected to overcome the indifference and the opposition to vaccination and to make the Health-Unit area well protected against smallpox. The registration of vital statistics and the keeping up of the unprotected register are done in the Health Unit by the sanitary inspectors and not by the revenue authorities, and therefore much better registration will be possible and vaccination work will be very much facilitated.

Typhoid control.

The health survey showed that, next to smallpox, typhoid fever was responsible for the greatest number of deaths. The control of typhoid in a rural area with hardly any latrine arrangements, and with water supplies open to gross pollution is certainly a very serious problem. Early diagnosis with the help of the laboratory, adequate home nursing and isolation, and the use of T.A.B. vaccine for all contacts and neighbours form the only methods of control possible. Typhoid is a notifiable disease in the Health-Unit area and arrangements are made to make the above methods of control available for all the reported cases. The medical officer of health with the laboratory is responsible for early diagnosis and vaccination of all contacts. The lady sub-assistant surgeons have to attend all the cases and instruct some member of the family in sick-nursing and isolation of the patient. This system of instructive nursing is quite feasible in a place like Travancore with a very high level of education among females. There is a government hospital at the head-quarters of the Unit to which serious cases can be referred for treatment. By the adoption of the above programme it is expected to have satisfactory control over typhoid fever. The Unit is organised for the control of other communicable diseases as they arise, but they do not form part of the routine work in operation.

Maternity and child welfare.

In spite of the comparatively low average of infant mortality, there are many areas in the Health Unit where the deaths of infants have reached alarming proportions. The preventable deaths among infants and mothers remain high on account of the extensive activities of the barber midwife. The Health Unit is attempting to replace the barber midwife by the fully-qualified midwife. Including the midwife in the government hospital there are five fully-qualified midwives available in the Health-Unit area to serve a population of nearly 40,000 people. This staff should very soon be able to take charge of almost all the deliveries.

All pregnant women in the area have been registered in the health survey, as well as all the infants and the pre-school children. The two lady sub-assistant surgeons visit these people either in their homes or in one of the clinics. There are four maternity and infant clinics held at four different places in the Health Unit. The clinics are held at each place once a week and the pregnant women and the infants are advised to attend these clinics. Those who do not attend the clinics are visited at less frequent intervals by the lady sub-assistant surgeons during the home visiting. There is a card kept in the Health-Unit office for each mother and child and entries are made in the card whenever they are seen by the lady doctor at the clinic or the home. In addition to complete physical examination and examination of urine, attention is given to minor ailments which can be easily attended by a nurse or a midwife. Cod-liver oil is given to deserving children and milk feeding also forms an important item. For this purpose collections are made locally and through social service agencies. The lady sub-assistant surgeons also investigate all cases of maternal and infant deaths and their findings are filed in

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separate investigation cards which are designed for this purpose.

School medical work.

School medical work is in charge of the assistant surgeon of the Unit. There are 39 schools in the Health-Unit area with 6,427 pupils. The assistant surgeon spends all the week days making complete physical examinations of these children. The findings are entered in a special card, one for each child. On Saturdays and Sundays the assistant surgeon works at the government hospital and treats all the children that are referred to by him for hospital care during his examinations in the week. The parents are instructed to take these children to the hospital for treatment on Saturdays and Sundays.

Health education.

After an intensive educational campaign in the first quarter the Health Unit has settled down to a regular programme of weekly health lectures. All the members of the staff take part in this by turns. A magic lantern and sets of slides are also available. When special occasions arise the services of the health educational officer and use of a cinema and public-health films are also available from the head office.

The waiting room at the Health Unit office is well stocked with pamphlets, posters and booklets on health subjects and is available for the public on all days except Sundays.

Discussion of cost.

The above programme of intensive health work has been in operation for two months, excluding the 3½ months taken up for the health survey. This organisation is making available for an essentially rural area, the various facilities for the prevention of disease and the promotion of health, which are ordinarily available only in big cities with well-organised public-health work. The programme is based on the assumption that with a fair level of education among the masses it will be possible to secure the co-operation of individual families for the improvement of their houses and surroundings in such a way as to ensure reasonable protection from diseases. A generally high level of education is available in Travancore, more than perhaps in any other part of India. A well-organised health personnel working in this area and backed by a steady programme of health education will very soon be able to influence public opinion favourably and to secure that willing co-operation from individual families on which depends the entire success of public-health work. The Health Unit offers free attention during pregnancy, free attendance during confinement, care of babies at the child-welfare clinics, care of health of the boys at school and protection to the general population against the common communicable diseases. In the course of this work and in the course of the public-health propaganda the officers of the Unit come into intimate contact with the individual householder and are able to exercise their influence in making those small changes in domestic sanitation, such as improvement of the wells and the provision of suitable latrines, which are the foundations of rural health. These improvements can never be taken up by the State and have always to be provided by the individual. There is ample evidence even in its short period of working that the Health Unit is able to get these fundamentals of rural health accomplished.

The only criticism so far levelled against the above type of health organisation is its cost. The Neyyattinkara Health Unit has an annual budget of Rs. 16,000. This low figure is due to the scale of salaries in the Travancore State, but the fact remains that a complete health programme of this type is available for nearly one hundred thousand people in a rural area for Rs. 16,000. If the whole of the State is to be organised on this basis and if every individual family in the State is enabled to get the health facilities that are now available in Neyyattinkara, it can be managed for a sum of Rs. 10 lakhs annually which certainly is not much in a state with an annual income of 250 lakhs of rupees. The scheme of public-health reorganisation submitted by Dr. Jacocks does not, however, contemplate this expenditure in the immediate future. The suggestion is only to develop selected areas of the State on these lines, leaving the rest with a less intensive type as in other parts of south India, and to work up the programme periodically till we have a complete health organisation at the end of fifty years or more. Moreover, this type of health organisation as it develops will be able to get substantial contributions from municipalities and other organisations interested in public-health work, as the Unit will be able to take up all this kind of work, and it is also possible that with a sufficient number of health units in operation there will be a substantial reduction in course of time in the budget allotment under "medical relief." The scheme of public-health reorganisation now taken up in Travancore is one that is of immense importance. Travancore administrators displayed clear vision and statesmanship in the liberal support they gave for the education department in connection with its organisation and development, during the last 25 years, until to-day the State leads the rest of India in education, especially in female education. The same liberal support to the development of the public health department, will make the State the safest and the healthiest place to live in during the next quarter of a century. The rural-health organisation at Neyyattinkara has this ideal in view and it will not be long before such organisations spread to other parts of the State.

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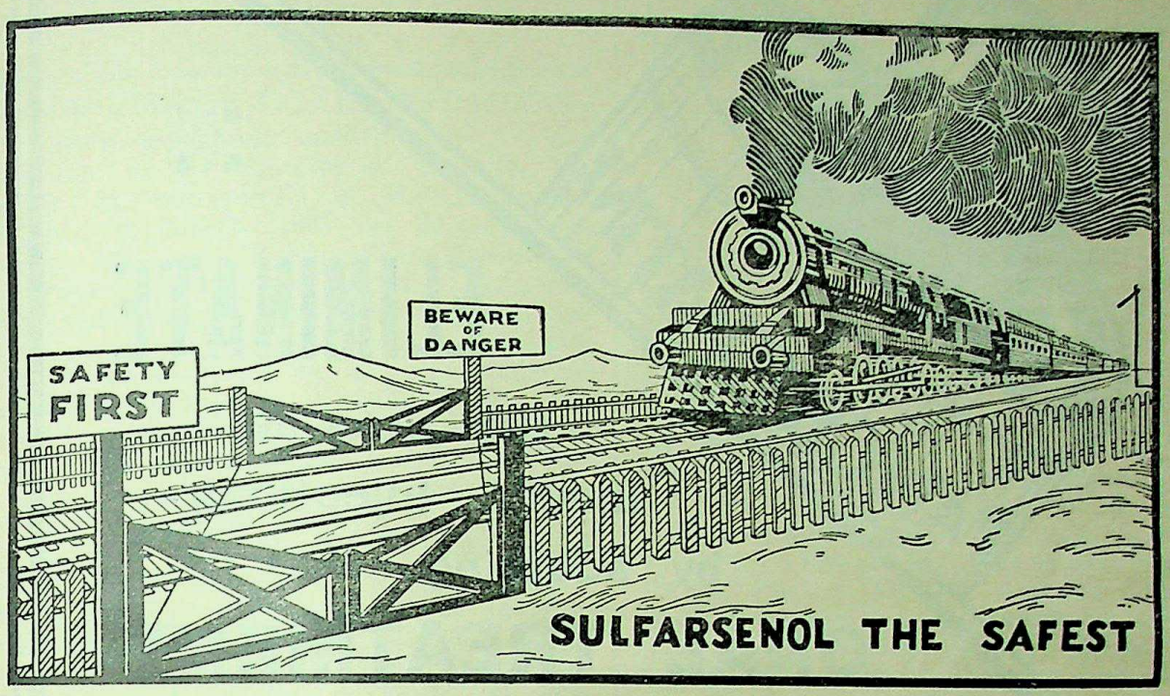

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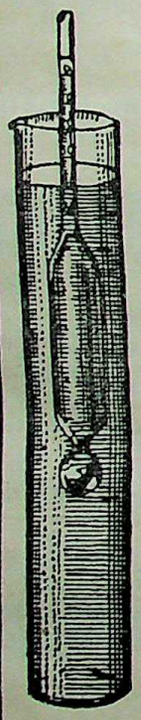

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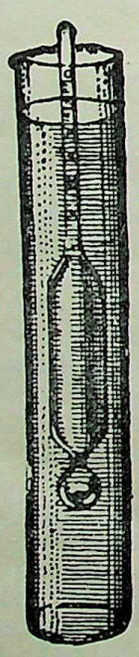

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Indian Medical Gazette.

DECEMBER.

WEIL'S DISEASE IN THE ANDAMANS.

A VERY important contribution to our knowledge of the diseases of India is the memoir on leptospirosis in the Andamans, published in March, 1931, by Lieut.-Col. J. Taylor, I.M.S., and Dr. Amar Nath Goyle from the Pasteur Institute of Burma, Rangoon*. As probably only a small percentage of our readers see the *Indian Medical Research Memoirs*, we may here take the opportunity of reviewing this work of Colonel Taylor and Dr. Goyle, for, as a piece of medical research work, it has that reliability and completeness which is so satisfactory to the enquiring mind.

That Weil's disease exists in the Andamans has long been an article of faith with medical men working in those islands. Chowdry (1903)† recorded peculiar cases of jaundice associated with malaria, but also with a high mortality—78 deaths in 588 cases observed in ten years. Woolley (1911) recorded 40 cases with 17 deaths in 1909. In 1913 he gave a more detailed account of the disease, differentiated it from malaria, and noted its association with standing water. de Castro (1922) comments on the very toxic character of the disease, the early onset of albuminuria and of hæmatemesis, and the absence of malarial parasites from blood films.

In these earlier papers, the authors appear to have had some considerable doubt as to what disease they were dealing with. The credit of proving that the epidemic jaundice of the Andamans is Weil's disease goes to Barker. His paper, which was a thesis for an M.D. degree, was published in our columns in 1926. He gave a full and detailed account of the epidemiological facts and clinical course of the disease, and described the finding of leptospiræ in stained films of the urinary deposit and in films from the liver of a fatal case. Barker's work was greatly hampered by want of proper facilities for cultures and for dark-ground observation, but an important finding of his was his complete inability to infect guinea-pigs from the blood or centrifugalized urine of cases.

Deuskar (1928) published a record of 23 cases treated in Haddo Hospital in 1926. H. C. Brown (1928) had sera from three typical cases—two of which proved fatal—posted to him in London, and typed them against standard cultures of leptospiræ, using both the agglutination and adhesion tests. Positive results were obtained with two Sumatra strains ("Rachmat" and "Deli A"), but negative results with leptospira strains from London, Holland, and a rat strain. It now became clear that the epidemic jaundice of the Andamans is Weil's disease, and is due to a Far-Eastern strain or strains of the causative organism—*Leptospira icterohæmorrhagiæ*.

It now became necessary to carry out a full enquiry into the disease, to determine its importance in the islands, its epidemiology, and to work out measures for its prophylaxis and control. The Home Department of the Government of India provided the necessary funds for a six months' enquiry under the Indian Research Fund Association, and Dr. Goyle and party left Rangoon for Port Blair in June 1929, returning in October with the data, cultures and material collected to be studied in more detail at the Pasteur Institute of Burma. The memoir under consideration is the outcome of this very successful enquiry. In all 73 cases of suspected leptospiral infection were studied in full detail by clinical and laboratory methods, of which 64 were proved to be Weil's disease by blood culture, serological tests or microscopical examination of the urine; the remaining 9 were probably instances of other diseases.

The penal settlement of Port Blair occupies an area of 327 square miles, partly cleared for cultivation, grazing and habitation, and partly afforested, on South Andaman and the adjoining small islets. Much of the land has been reclaimed from swamps in which *Anopheles ludlowi* abounds, and swamps and standing water in the paddy fields are a feature of the settlement during the south-west monsoon. The population in 1929 consisted of: administrative establishment—1,777, free resident population—7,200, and convict population—7,901. It is amongst the labouring convicts and "self supporters"—*i.e.*, released convicts settled in villages on the land—that the disease mainly occurs.

Chapter II of the memoir gives a detailed and most valuable clinical account of the disease; fatal cases, cases of moderate severity, mild cases, and non-icteric cases are described; exhaustive tables enumerate the signs and symptoms, and the laboratory findings. An outbreak of 18 cases occurred amongst a gang of 125 men engaged on the construction of a bund near Mithakhari village, the men standing knee deep in water for long periods. The first case occurred 6 days after the commencement of the work; the last case 8 days after its cessation, thus enabling the incubation period to be fixed with some degree of certainty at 6 to 8 days. Roughly speaking, the clinical course of the disease may be divided into three phases: (*i*) febrile period, from the onset to the 6th or 7th day; (*ii*) icteric stage from the 7th or 8th to the 12th or 13th day; and (*iii*) gradual convalescence from about the 13th day onwards.

* Taylor, J., and Goyle, A. N. (1931). Leptospirosis in the Andamans. *Indian Medical Research Memoirs*, supplementary to the *Indian Journal of Medical Research*, No. XX. Calcutta: Thacker, Spink & Co., Ltd. (In Voluntary Liquidation). Price, Rs. 6.

† The references are all given in the original memoir, so need not be duplicated here.

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The onset of the disease is sudden, usually heralded by a shivering fit, with generalised pains, extreme prostration, and a temperature of 102°—104°F. A symptom of diagnostic value at this stage is the extreme muscular tenderness of the calves, this being so marked that even a slight touch of the hand will cause the patient to cry out with pain. There is irregular pyrexia—100° to 103°F.—during the first week, ending by gradual lysis. A secondary fever was observed in 12 cases (out of the 64), intermittent in character, 100°—102°F., and lasting for 1 to 8 days. It is important to note that the fall of the primary fever does *not* herald convalescence; the patient may die after 3 or 4 days with a normal temperature. The pulse tends to be rather slow as compared with the temperature. With regard to blood changes, there may be marked destruction of red cells, and loss of hæmoglobin in the late stages of severe and fatal cases. Leucocytosis is an early and striking feature of the disease—in 26 cases counts of over 10,000 per c.mm. were obtained. This persists as a rule into the third or fourth week or even longer. This leucocytosis is chiefly due to an increase in the number of the lymphocytes; when present the sign is a useful aid to diagnosis, but its absence is not evidence against Weil's disease. Myelocytes may occur.

Jaundice was completely absent in 22 out of the 64 cases in which the diagnosis was established by laboratory methods. It commonly appears about the 4th to the 5th day, was moderately intense in 20 cases, and extremely intense in 14. It is usually very well marked in fatal cases, and is usually first noticed in the conjunctivæ. Barker noted jaundice in all his cases, but he was probably relying on it as the chief diagnostic sign. Fletcher (1928) noted the absence of jaundice in 18 out of his 32 cases in the Federated Malay States. During the Great War jaundice was said to be absent in some 40 per cent. of the cases which occurred at the British front in France. Hæmorrhagic herpes labialis—widely noted in cases in Europe—was not noticed in the cases in the Andamans and Malaya.

The prostration is out of all proportion to the temperature and other symptoms. "It is not uncommon to find a well-built fellow (a Sikh or Pathan from Northern India) with a normal temperature, with or without jaundice, lying prostrate in his bed and unwilling to answer questions. This extreme degree of prostration, combined with muscular tenderness, is enough to make a correct diagnosis of the disease in most cases".

The urinary changes are detailed in table IV of the memoir. Oliguria is the rule, but only two cases showed retention. Albuminuria—from faint traces to considerable amounts—usually occurs early and is readily detected (29 cases); it may persist up to the 42nd day into convalescence. As a rule non-icteric cases are albumin-free, and jaundiced patients show a variable quantity of albumin in their urine. Bile is present as a rule in the urine of jaundiced patients; it often persists until the end of the fourth or fifth week. The "acetic acid test"—an intense green colour on the addition to the urine of a drop of pure acetic acid—was negative throughout, and Russo's methylene blue test was positive in only 7 cases. No chemical test of the urine appears to have much value in diagnosis. Hyaline and granular casts are frequently found, and very rarely blood casts.

Hæmorrhages occurred in 13 cases—20 per cent.: in order of frequency these were hæmoptysis, melæna, and bleeding from the gums and elsewhere.

It is obvious from the above analysis that the diagnosis of Weil's disease should be straightforward enough if the medical man is living in an endemic area, and is aware of the local existence of the disease. Otherwise, the disease will probably be mistaken for subtertian malaria of virulent type.

Turning to methods of laboratory diagnosis, here the memoir contains much information of value. The authors found direct microscopical examination of the blood for leptospiræ, either by dark-ground illumination or by means of stained films, a procedure of no value at all in the diagnosis of the disease—a finding of importance in view of the fact that previous workers had laid stress on the value of this method. Blood culture is undoubtedly the most reliable method of diagnosis and should be used in all cases suspected of being Weil's disease. Out of 64 cases in which blood culture was done, 36 were positive, and also 80 to 85 per cent. of cases whose blood was cultured on the 4th or 5th day of the disease. Blood cultures taken later than the 7th day of the disease were uniformly unsuccessful. The media recommended are those of Noguchi (1928) and of Fletcher (1928)—the latter yielding primary cultures with great regularity in early cases, and the cultures remaining viable up to four months. Details of technique are as follows:—

(*i*) *Noguchi's medium.*

0.9 per cent. sodium chloride ..	800 parts
Rabbit serum	100 „
Hæmoglobin solution ..	0.1–0.2 „
2 per cent. nutrient agar ..	100 „

Melted agar is cooled to about 45°C. and added quickly to the saline hæmoglobin and serum mixture which has been warmed to about the same temperature. The medium is thoroughly mixed as it has been found that a medium containing flocculent agar particles is not as suitable as one of uniform gelatinous consistency. The hæmoglobin solution is made by laking one part of defibrinated rabbit blood with three parts of distilled water.

(*ii*) *Fletcher's medium.*

Rabbit serum	1.0 c.c.
Sterile distilled water or tap water	7.0 c.c.
2.5 per cent. agar	0.5 c.c.

To prepare the medium several rabbits are bled from the heart with 20-c.c. syringes. The sera are allowed to separate out and are then pooled. Measure the quantity of serum obtained and prepare and sterilize

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in a flask the quantity of distilled water necessary to dilute the serum to 10 per cent. to 12 per cent. Heat the serum water mixture to 50°C. in a water bath. Melt nutrient agar (2.5 per cent. to 3 per cent. of pH 7.5) and add 6 c.c. of the agar to every 100 c.c. of serum water. Mix well. The medium carefully prepared should not contain flocculent particles visible to the naked eye. Media thus prepared should have a reaction of about pH 7.4, or else the reaction should be adjusted to this pH. The medium is tubed in 5 c.c. quantities and heated at 56°C. for one hour on two successive days.

In inoculating the tubes, four or five test tubes, each containing about 7 c.c. of the medium are inoculated with quantities of the patient's blood varying from 0.1 c.c. to 1 c.c. Growth takes place best at from 25 to 30°C. At 37°C. growth is more rapid, but the cultures do not remain viable for as long. Leptospiræ appear in from 7 to 10 days time in primary cultures, and earlier in sub-cultures. The tubes should be kept in the dark, as direct sunlight may kill the organisms; they are best placed in media jars with close-fitting vaselined lids. For prolonged sub-cultivation it is desirable to add a layer of liquid paraffin to prevent evaporation. Growth occurs as an opalescent layer near the surface sharply demarcated from the clear medium below.

In direct contrast to the experience of workers in Europe, Taylor and Goyle found that direct inoculation of guinea-pigs with patients' blood or with the centrifugalized urinary deposit was of no value as a diagnostic procedure. Out of 22 guinea-pigs inoculated with blood only one died from leptospirosis, although several of these bloods yielded direct positive cultures. Of 19 guinea-pigs inoculated intraperitoneally with urinary deposit none died of Weil's disease. On the other hand, the failure to infect guinea-pigs may partly have been due to using adult animals. On return to Rangoon, the Andamans' virus was established in young guinea-pigs of 100 to 200 gms. weight and rapidly became virulent on sub-passages.

Examination of the centrifuged urinary deposit with dark-ground illumination or in Fontana-stained films is a diagnostic procedure of value in the later stages of the disease. Leptospiræ may appear in the urine as early as the 9th day; they reach their maximum number about the 15th day of the disease; and continue to be intermittently excreted up to the 44th day or longer. Inoculation of animals with the urinary deposit is apt to be unsuccessful unless young guinea-pigs are used, whilst cultures from the urine present considerable difficulties owing to the high percentage of contaminations.

The finding of leptospiræ in post-mortem material is very uncertain. The best method is to use dark-ground examination of fresh emulsions of liver and kidney for leptospiræ. The organisms frequently disappear from the liver as early as the 7th day of the disease. In contrast to this in the case of experimental animals the finding of leptospiræ in sections of organs presents no difficulties, and they are frequently to be found in the blood of experimentally-infected guinea-pigs by direct dark-ground examination.

Serological tests for the disease are chiefly of value in its late stages, in convalescence, and after recovery. The agglutination test is carried out in the same way as the Widal reaction. The leptospira cultures should be put up in Fletcher's medium, from which the agar may be omitted in order to secure a more even and uniform distribution of the leptospiræ. A dropping pipette is used in making the mixtures and the first series of dilutions used should be from 1:20 to 1:160. The tubes are either incubated at 37°C. for 3 to 4 hours, or kept at room temperature for 16 hours, and the contents of each then examined under dark-ground illumination. Immobilization, agglutination and lysis occur. Agglutination up to titres of 1:500 may be found as early as the 15th day of the disease, and may persist for a year or more after recovery.

The adhesion test or Rieckenberg phenomenon is of great value in diagnosis, and has been widely used by a number of workers. It becomes positive from the 12th day of the disease onwards. Equal parts of the patient's serum, leptospira culture, and a bacterial suspension—*e.g.*, a bacterial suspension of an agar culture of *B. coli* emulsified in normal saline—are mixed, the mixture incubated at 30°C. for 20 minutes, and then examined by the dark-ground method. In a positive case the bacteria will be found adhering to the leptospiræ in varying numbers, and as a rule other particles in suspension will also be seen to adhere. The adhesion test is extremely specific for the strain of leptospira used. The sera of 72 persons in three villages in the settlement were tested; 13 gave a positive reaction, and of these 3 were definitely known to have suffered previously from Weil's disease. The test was also found positive with the serum of a convict who had had the disease in 1923.

Fletcher has employed Pfeiffer's reaction fairly extensively in classifying different strains of leptospiræ. The Andamans strain of *L. icterohæmorrhagiæ* appears to be one of Far-Eastern type conforming to some of the Sumatra strains, but not to European strains.

Complement-fixation tests have been suggested in the diagnosis of Weil's disease, but here there is a risk that syphilitic sera may give a positive result, and the method is not of definite practical value as compared with other more definite tests.

Turning to the epidemiological features of the disease as studied in the Andamans, all cases seen were adult males, and this is due to the special incidence of the disease in labourers working in swamps and employed in agriculture and in bund construction. The outbreak in connection with the bund at Mithakhari is the only one which can be said to have been epidemic; the remaining cases were widely scattered, chiefly in ones and twos, over a wide area. The earliest case was seen on the 27th June, and the latest on the 24th October; the infection is very closely associated with south-west-monsoon conditions, swamps and flooding.

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A very important finding in the memoir relates to the hydrogen-ion concentration in infected water supplies and swamps. Sardjito and Zuelzer (1928) have shown that the optimum conditions for the growth of water leptospiræ in natural sources are a pH of 7.3 to 7.8, combined with a temperature of 82° to 86°F. On the east coast of Sumatra, where these conditions prevail, Weil's disease is common, whereas in Java, where leptospiral infections are rare, the majority of waters have a pH of about 6.0. In the Andamans ten water supplies, all of which showed leptospiræ, had pH values ranging from 6.9 to 7.6; in the case of five others from which leptospiræ were absent the pH value was less than 6.6. Waters are found in most parts of the settlement in which pathogenic leptospiræ would be able to exist.

A consideration of the epidemiological conditions in the Andamans leads the authors to a discussion on the relationship or otherwise of the free-living leptospiræ of water supplies and the pathogenic leptospiræ of rats and man. All the accumulated experimental and epidemiological evidence of recent years supports the view that human beings contract infection with *Leptospira icterohæmorrhagiæ* by direct penetration of the skin by leptospiræ whilst they are in contact with (often standing working in or bathing in) infected waters, whilst the infection is apparently confined in Nature to man, the dog, and the rat. The evidence for and against the pathogenicity of the free-living leptospiræ is conflicting, and the authors are probably right in wisely suspending judgment. It seems more likely that recent contamination of waters may arise from infection by the urine of human convalescent cases.

As far as the Andamans go, here there is no evidence to incriminate the rat at all as a carrier. The Mithakhari bund outbreak clearly suggests recent and probably repeated infection of the water by the urine of a convalescent patient. So far as limited observations go leptospiral infection is uncommon in rats in the settlement, whilst during the infective period of the monsoon the rats leave the infected swamps and make for higher and drier ground.

Turning to prophylaxis, Toyama has suggested the application of calcium cyanamide as a fertilizer to destroy leptospiræ in infected paddy fields and similar situations. A suspension of 1:5,000 was found by Taylor and Goyle to kill leptospiræ at a pH of 7.5 in five minutes: a suspension of the strength 1:10,000 killed in eighteen hours. Some 44 lbs. of calcium cyanamide fertilizer per acre for each inch of standing water would be required. The handling of the substance is difficult since it is very finely divided and tends to get into the eyes where it is intensely irritating. The use of acids to lower the pH of the soil is a problem which would demand a great deal of investigation, though in the case of localized outbreaks such as that at Mithakhari a temporary disinfection of the water by the use of sulphuric or mineral acids might be feasible. What does seem to be most important of all is the detection of all mild cases of the disease, the registration of all convalescents, and their detention under observation until the urine has become free from leptospiræ. Individuals who have recently suffered from Weil's disease should not be employed on gang work in swampy areas during the monsoon.

The main body of the memoir is followed by an appendix of 72 pages—a summary of our present knowledge of leptospiral infections. This section of the work will be invaluable alike to the clinician, the laboratory worker, and the research student. It gathers together into convenient compass information from very numerous and widely scattered sources not available to the ordinary reader, and constitutes the most important monograph on the disease since Buchanan's report to the Medical Research Council in 1927. The work then concludes with a most useful bibliography of some 150 references.

. . . . . .

The publication of this memoir, we hope, will draw the special attention of medical men in India to the probable existence of human leptospirosis in this country. The reports on this matter are hitherto scattered, scanty and unsatisfactory. After the return of Dr. Goyle from the Andamans, a typical case was detected in the Rangoon General Hospital; this proved fatal, and leptospiræ were demonstrated in the kidney tissues after death. Using the cultural methods advocated by Taylor and Goyle, leptospirosis has been discovered in 1931 in rats in Calcutta, and it is hoped to publish a note on this in the next annual report of the Calcutta School of Tropical Medicine. There are probably many areas—and especially seaports—in India where conditions are suitable for the local infection of dockyards, tidal basins, and water supplies. Very important points to note in the memoir are the great importance of blood culture in the diagnosis of the disease, the association of a high hydrogen-ion concentration with the infection of water supplies, and the value of the serological tests in convalescence and in the detection of outbreaks which have ended before investigations are made.

Addendum.

On page 605 of our last issue the explanatory wording, belonging to the graph which accompanied Drs. Napier and Krishnan's article on 'A Theory of the Ætiology and Epidemiology of Kala-Azar in India' was omitted; this reads:—Seasonal distribution of kala-azar (Napier, 1927) and malaria (Knowles and Senior White, 1930) in Bengal. The graphs are based on 2,130 and 1,396 cases, observed during 4 and 8 years, respectively.

NOTICE

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Medical News.

BOMBAY MEDICAL COUNCIL.

THE following is a summary of the proceedings of a meeting of the Bombay Medical Council held on the 28th September, 1931.

The election to the Council of Mr. Rochiram Asanand Amesur, Hospital Assistant, and of Dr. Jivraj N. Mehta, M.D., M.R.C.P., and the nomination of Major W. C. Spackman, I.M.S., as a member were announced.

The Council resumed consideration of the case of Mr. Kaiku Sorabji Ghasvala, L.M.S., of Bombay, judgment in which had been postponed on the two charges proved against him to the satisfaction of the Council, *viz*—

(1) That contrary to rule 20 of the Code of Medical Ethics he has styled his private Nursing Home, Dispensary or Hospital after his own name; and

(2) That contrary to rule 22 of the same Code upon the notice or signboard exhibited outside the building in which he carries on his practice he mentions certain positions therein stated to have been held by him on the staff of the Sir C. J. Hospital and at the Grant Medical College.

The Council judged Mr. Ghasvala to have been guilty of infamous conduct in a professional respect and directed the Registrar to remove his name from the Bombay Medical Register.

The Council resumed consideration of the case of Mr. Shripad Narhar Kulkarni, M.B., B.S., of Hubli, Dharwar, judgment in which had been postponed on the charge proved against him to the satisfaction of the Council, *viz*, that, contrary to rule 2 of the Code of Medical Ethics, on or about the 12th March, 1930, without having previously had one Rachangauda Rudragauda of Sulla village, Hubli Taluka, under his treatment or observation he gave him or some person on his behalf a certificate to the effect that the said Rachangauda Rudragauda was under his treatment from the 11th March, 1930, for acute dysentery and had been advised by him to take complete rest in bed for a fortnight, which certificate was false to his knowledge, and that he gave such certificate for the purpose of making it possible for the said Rachangauda Rudragauda to obtain an adjournment of a criminal case in which the said Rachangauda Rudragauda was the accused.

The Council judged Shripad Narhar Kulkarni to have been guilty of infamous conduct in a professional respect and directed the Registrar to remove his name from the Bombay Medical Register.

The Council considered a further correspondence between the Government of Bombay and the Government of Portuguese India showing that before accepting for registration in Portuguese India the qualifications proposed by the Bombay Medical Council that Government would like to be furnished with the following information:—

(*a*) A list of Colleges and Medical Schools of the Bombay Presidency whose diplomas the Bombay Government desire should be recognised in the Portuguese Indian territories, and

(*b*) The degrees conferred by those Colleges and Medical Schools with an indication whether those degrees are equal, superior or inferior, to the L.C.P.S. diploma.

The Council resolved to inform the Government of Bombay for communication to the Government of Portuguese India that all persons on the Bombay Medical Register possess qualifications which after scrutiny have been decided to be qualifications justifying their inclusion in the Register.

The Council considered certain rules framed by the Government of India governing the grant of medical certificates to railway servants applying for leave on medical grounds, and resolved (1) that the decision which the Government of India had arrived at is not in keeping with the principle that registration by law under the disciplinary control of a legally constituted Council places all registered medical practitioners on the same footing as regards original medical certificates —a principle accepted throughout Great Britain and by most Administrations in India—and (2) that the Council should press for the recognition of that principle.

The Council considered, with reference to section 9 of the Bombay Medical Act, the case of Mr. Balubhai H. Bhatt, M.B., B.S., of Nadiad, who was tried by the Sessions Judge of Ahmedabad under section 354 of the Indian Penal Code and sentenced to one year's rigorous imprisonment, the conviction being, on appeal, confirmed by the High Court, who however reduced the sentence to one of a fine of Rs. 200. The Council resolved to direct the Registrar to remove the name of Mr. Bhatt from the Medical Register.

The Council considered the question of the interpretation of the latter part of rule 20 of the Code of Medical Ethics in regard to the use of high sounding medical terms on signboards, and resolved to modify the rule as follows:—

That it is not proper for a practitioner to style a private nursing home, dispensary, consulting room, office or hospital either after his own name or one with a medical significance.

The Council resolved to record certain papers placed before them for information, showing that one Nanji Harjivan Chhatbar of Mahuva, Bhavnagar, who was originally a compounder, is a vakil by profession holding a sanad from the Bhavnagar State; that he had been advertising that homœopathic degrees could be obtained from his institute at Mahuva on payment of certain sums; that he is the self-styled principal of the institute where there are no students but he professes to give instruction by correspondence; that on the Bombay Medical Council bringing Mr. Chhatbar's proceedings to the notice of the Bhavnagar Council of Administration, that Administration gave him a warning; that as the warning had no effect and he continued to deceive the outside public, the Bhavnagar Durbar cancelled his sanad as a Vakil and instituted legal proceedings against him with the result that he was required to furnish two sureties of Rs. 500 each and to give one personal security of Rs. 500, or in default to suffer one year's imprisonment.

The Council resolved to record certain papers placed before them for information showing that an institution known as the Indian Medical Institute established by one Mr. Mahendranath S. Travadi of Ahmedabad had issued a prospectus in which it was announced that that institute would confer allopathic diplomas. As Mr. Travadi was not authorised to grant such diplomas, the Government of Bombay ordered the District Magistrate, Ahmedabad, to institute the necessary legal proceedings for the prosecution of Mr. Travadi under the Indian Medical Degrees Act, with the result that he was convicted under section 5 of the Act and fined Rs. 100.

The Council considered a letter from the Government of Bombay asking for the views of the Bombay Medical Council on the following proposal of the Government of India to add a fresh section, as section 5A, to the Indian Medical Degrees Act:—

"5A. Whoever adds to his name letters or abbreviations which imply that he is qualified to practise any system or method of medicine other than letters or abbreviations indicating qualifications—

(*a*) Which are: (*i*) Recognised by any law for the time being in force in British India, or in any part thereof; and (*ii*) have been granted by any authority referred to in section 3; and

(*b*) Which he actually possesses,

Shall be punishable with fine which may extend to five hundred rupees, or if he subsequently commits, and is convicted of, an offence punishable under this section, with fine which may extend to one thousand rupees."

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The Council resolved to inform Government that while accepting the proposal the Council consider it to be only a half measure inasmuch as whilst it penalises persons assuming such titles it leaves those bogus institutions—even a one-man institution—which grant such titles or diplomas free to carry on their trade in order to deceive the public; that unless and until the amendments drawn up in 1926 by the Legal Remembrancer to the Government of Bombay are embodied as additional amendments, the existing unsatisfactory conditions of unqualified and unlegalised practice involving the health and lives of the people will continue to prevail, entailing enormous harm on the ignorant and even educated public; and that the evil complained of in 1926-27 has become greatly aggravated in almost all the principal towns of India, thus emphasising the urgent necessity of amending the Act as suggested above.

The Council resolved to re-appoint Mr. Joseph Bocarro as Registrar for the year beginning on 1st November, 1931.

THE PRESCRIBER.

The Prescriber, a monthly review of medical progress published in Edinburgh, celebrates its twenty-fifth birthday this month. The October number contains an editorial article sketching the history of the journal. Started in a small way by the present editor, Dr. Thomas Stephenson, this journal has steadily grown in size and influence, and to-day it has a world-wide circulation. There are few journals which the general practitioner will find more useful. Each month under the heading "Therapeutic Progress" one subject is dealt with very comprehensively, all the recent work on this subject being reviewed. The chief medical subject dealt with in the October number is skin diseases, a review of which covers 31 pages.

We congratulate the editor and his staff on completing their twenty-five years of successful publication, and wish them every success for the future.

SOCIETY OF BIOLOGICAL CHEMISTS, INDIA.

A SOCIETY under the above name has recently been formed, largely as a result of the enterprise of certain members of the Department of Biochemistry of the Indian Institute of Science, Bangalore.

On the 24th March, 1931, a circular letter was addressed to various institutions devoted to the study of biological subjects and to numerous individual workers in different parts of India, conveying the proceedings of a meeting held at Bangalore and inviting opinions regarding the organization of a society of biological chemists, the aims and objects of which should be to:—

(1) Co-ordinate the biochemical work done in various parts of India,

(2) Arrange meetings either under the exclusive auspices of the Society or in association with other societies for exchange of ideas and reading of original papers,

(3) Issue annual reviews and abstracts of the biochemical work done in India, and

(4) Conduct a journal when occasion demands.

The response to the invitation was very satisfactory.

As a first attempt in the co-ordination of biochemical work done in India, the Society has now published the first annual report of the progress in biochemistry and allied subjects in India in 1930.

It is stated that the Society does not contemplate publishing a journal at the present juncture. It is, however, hoped that when the volume of biochemical work in India increases, the Society will conduct a journal which, though mainly devoted to the publication of Indian work, will also accept contributions from abroad.

The provisional committee of the Society include V. Subrahmanyan, D.SC., F.I.C., C. V. Natarajan, B.SC., M.B., B.S., DT.P.H., and V. N. Patwardhan, M.SC., A.I.I.SC.

TO CHECK THE GROWING MENACE OF QUACKERY.

WE reproduce below (*verbatim*) a copy, forwarded by the Honorary Secretary, of a resolution passed unanimously by the general body of the Sind Medical Union at a meeting held on September 15th, 1931.

As the practice of the Allopathic or Western System of Scientific Medicine requires for satisfactory qualification to practise a lengthy and exacting preliminary course of studies and training, and a higher standard of proficiency in general education and basic sciences and in Physics, Chemistry and Biology and the medical sciences of Anatomy, Physiology, Materia Medica, Pharmacology, Pathology, Bacteriology, Clinical Medicine, Clinical and Operative Surgery, Gynæcology, Obstetrics, Pediatrics, Ophthalmology, etc.

And as there is a large and rapidly growing number of totally unqualified persons, chiefly of the class of ex-compounders, posing as allopathic physicians and exhibiting and using diplomas, degrees and designations that are colourable imitations of allopathic diplomas, degrees and designations, or are ambiguous and misleading, in order to pass off as qualified allopathic physicians and to mislead the general public to believe that they had the same or a similar course of studies and training and examinations and are as qualified and efficient as qualified allopathic physicians, and as these unqualified persons are practising or claiming or attempting to practise the allopathic system of medicine for remuneration and are using or attempting to use allopathic methods of diagnosis of diseases and allopathic drugs and other remedies and methods of treatment, which methods of diagnosis and treatment they are utterly inefficient to practise on account of not being properly trained and qualified, and as on account of their inefficiency they are doing great harm to the ignorant public who fall in their hands.

And as on account of the low standard of education in this country, even among the well-to-do, the public to their great harm are unable to distinguish between the duly qualified allopathic practitioner and the unqualified.

The Sind Medical Union is of opinion that under deterrent legal penalties such unqualified persons should be legally prohibited from:—

(1) Posing as allopathic physicians or practitioners in the Western System of Scientific Medicine,

(2) And/or exibiting and using diplomas, degrees and designations that are colourable imitations of allopathic degrees, diplomas and designations or are ambiguous and misleading and liable to be mistaken by the ignorant public for allopathic diplomas, degrees and designations or equivalent to the same,

(3) And/or attempting to practise for any remuneration the allopathic system of medicine and using allopathic methods of diagnosis of diseases and allopathic drugs, instruments, appliances and other remedies in the treatment of diseases, as is the normal legal practice of all advanced civilized countries as the U. S. A., etc.

Current Topics.

A Discussion of the Diagnosis and Treatment of Upper Urinary Tract Infections.

By ALBERT M. CRANCE, M.D., F.A.C.S.

(Abstracted from the *Urologic and Cutaneous Review*, Vol. XXV, No. 7, July 1931, p. 418.)

A GENERAL but brief discussion of the subject of urinary infections was prompted primarily because of the ever increasing diversity of opinions pertaining to

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their treatment and cure, and secondly, because of the apparent persistence of practitioners in general to disregard the extreme importance and possible seriousness of the presence of pus in the urine.

As an example of the latter statement, how many physicians take time to have a urine cultured which has on examination shown the presence of pus cells? Urologists throughout the world have written papers for many years on this very subject, for the chief reason that the treatment and ultimate cure of such infections depend solely on scientific reasoning. The type of infection must necessarily be known in each and every case.

Returning to the first statement regarding the ever increasing diversity of opinion, one may say that urologists disagree here considerably. For example, one very radical school puts the patient on the cystoscopic table every few days to wash out the kidney, disregarding the fact as to whether or not badly infected teeth or tonsils are pouring into the kidney more infection for them to wash out next time. On the other hand the subject of renal tuberculosis is creating considerable discussion as to its probable treatment. The surgical removal of a tuberculous kidney is rapidly losing popularity, although still providing a large amount of surgical material for those who believe in the procedure.

So much for introduction. The chief urinary infections to be considered are: (1) *B. coli;* (2) streptococcus; (3) staphylococcus; (4) tuberculosis. At the outset of this discussion it should be most strongly emphasized that in all cases with urinary symptoms showing pyuria we must always first of all determine by culture and microscopic examination the type of infection present, recalling that our treatment is vastly different in each and every type. The culture will, of course, show *B. coli,* streptococci, or staphylococci. For this reason, a "sterile culture" of urine containing pus is presumptive evidence of tuberculosis. The sample should then be carefully examined microscopically for tubercle bacilli, or if not found, a guinea-pig should be injected with some of the urine under suspicion. Let us again recall that not all strains of tubercle bacilli will grow in the guinea-pig, but all strains can be demonstrated under the microscope by a good bacteriologist if he is persistent enough to keep looking for them. This was strongly emphasized by Kearns in his work on tuberculous urines.

I. *B. coli.*

Supposing a culture shows a pure growth of *B. coli,* and it is very apt to, inasmuch as it is the most common of all urinary infections. What line of therapy should follow? Some two years ago the writer published a paper on this subject outlining in detail a very satisfactory routine of treatment. Many cases have been treated and completely freed of this stubborn infection before and since the publication of that paper and no change in the routine of treatment has been found necessary. This fact is of great importance. Treatments which change with every moon are not of sound value. Those which stand and continue to stand under the test of time are the ones which yield results.

First of all, in this infection, no urinary antiseptics of any kind are used, for two reasons. First they do no good and secondly there is no indication for their use. If we consider the ætiology of *B. coli* pyelitis we will readily see why this statement is made. Briefly *B. coli* get into the kidney and sooner or later into the bladder simply because these organisms are fed to the kidney through the blood or lymphatic streams from the intestinal tract, principally the colon. This explains why such a huge percentage of patients with colon bacillus infection in the urine give a clear history of marked constipation. On the other hand acute cases of *B. coli* pyelitis are not infrequently seen following acute intestinal upsets. The intestinal tract in this case becomes the focus of infection and it is one of the primary points to consider if this type of case is to be successfully treated.

Urinary antiseptics of various kinds have all been used and discarded by the writer because of their inability to attack the *B. coli.* There are many physicians who apparently believe that the only treatment for this infection is autogenous vaccine. It is true that this is a valuable part of the treatment, but by no means sufficient to cure any given number of cases. There are four essential factors to be carried out in the successful management of *B. coli* infection whether it be in one kidney or in both, and of course, always in the bladder. These are namely: (1) Enemas made of a weak mercurochrome soapsuds solution daily for at least three weeks; (2) the diet, which must be strictly followed and which consists of changing the intestinal flora by keeping the patient for two weeks on a protein diet, for two weeks on a fat diet and for two weeks on a carbohydrate diet. This indirectly interferes with the tendency for *B. coli* to grow because of the changing of intestinal flora; (3) the autogenous vaccine treatment; (4) acidophilus. Our procedure is to make the vaccine up to a strength of 1,000 million per c.c. and to administer it intragluteally at intervals of five days beginning with ½ c.c., 1 c.c., 1½ c.c. and from then on 2 c.c. doses. Ten of these are usually given. In a fairly large series of cases, the percentage of complete recoveries in *B. coli* infection has been over 85 per cent. In one prominent textbook on urology the author states that *B. coli* is practically an incurable infection. It is without question a very stubborn infection and the utmost co-operation between the physician and patient is extremely necessary. It is not customary in this infection to do any drastic procedure such as renal lavage. This has seldom been necessary.

The question arises as to which form of acidophilus preparation will be used. A careful study has been made of the various types of commercial products along this line and the one which has proven the most satisfactory has been the acidophilus in pure whey culture. This, without doubt, has a very beneficial effect in reducing the number of *B. coli* from forming in the intestinal tract. One advantage of this preparation is that it may be furnished fresh to the patient each week directly from the makers.

Summarizing, therefore, the successful treatment of *B. coli* infection in the urinary tract must be principally based upon our attack to remove, in so far as possible, the intestinal focus of infection. This may be accomplished by the enema treatment as well as the use of acidophilus and by changing the diet such as was described above. Incidentally, it might be well to mention that this is the only infection in the upper urinary tract in which vaccines of any kind have proven valuable. Autogenous vaccine in *B. coli* pyelitis is a very important part of the treatment. By using persistence with this treatment the average duration of the infection is about 10 weeks. It is important furthermore to obtain catheterized samples of urine for the purpose of culturing. A negative culture from a urine previously infected with *B. coli* is necessary in determining the cure, not merely by the absence of pus cells. We have seen in many instances cases which became negative in so far as pus cells were concerned, but upon culture showed several colonies of *B. coli.* It is surprising the number of patients that have previously been treated for this infection and were discharged simply because their symptoms had disappeared. Naturally recurrences followed simply because they were not treated until fully recovered.

Before leaving this type of infection in our discussion we should not overlook the question of pyelitis of pregnancy. I mention it here because this infection, whether it occurs early or late in pregnancy is practically always due to *B. coli* infection. The treatment here, of course, must necessarily be changed somewhat because of the mechanical differences with which one is confronted. The cause of the infection is undoubtedly the same except that the indirect causes such as intraperitoneal pressure upon the ureters and kidneys become

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more pronounced. If an individual has previously had a ureteral stricture it will naturally recur at this time and may add to the causes of kidney infection. However, the predominating cause is undoubtedly due to constipation during pregnancy, inasmuch as *B. coli* is the prevalent organism. The writer has treated quite a number of these cases both early and late in pregnancy, and as an argument against stricture it might be stated that never yet has it been impossible to pass a catheter up to the kidney on the infected side. Usually one finds evidence, by the ureteral catheter, of a marked retention of urine in the pelvis and frequently it is thick with pus, which is allowed to drain through the catheter until the flow is clear. The catheter may be left in as a matter of drainage and occasionally it is of considerable benefit to irrigate the kidney pelvis with some mild antiseptic solution. I have seen a sufficient number of pyelitis of pregnancy cases to be convinced that it is a type of case which should demand the utmost co-operation of the urologist and attending physician. The results of this treatment are very gratifying indeed. In the vast majority of cases the treatment by ureteral drainage is necessary only once. When we see the temperature drop from 104 or 105° to normal within twenty-four hours and when the patient is completely relieved of all symptoms at this time, nothing could be more convincing than that this is the ideal treatment to be used. Naturally these cases should receive the autogenous vaccine, the enema treatment, etc., the same as for the ordinary type of case.

II. Streptococcus.

Streptococci get into the kidney, ureters and bladder always because of some source of entry into the blood and lymphatic streams. The kidney, because of its function as a "filter", naturally picks them up and then the trouble begins. The two chief sources of this type of infection are infected teeth and infected tonsils. Abscessed or infected, devitalized teeth are almost always demonstrable in such cases. Furthermore, it is surprising to note the number of infected roots which may be found below dental plates, if we but insist on *x*-raying all jaws even though all the teeth are "out". If, after thoroughly searching, no dental infection is demonstrable, then the tonsils, regardless of their appearance, must be removed. In fact, they are too frequently left in even though many dental infections are found. Of more recent years we have learned that the prostate and seminal vesicles in the male are frequently overlooked as foci of infection, not only in renal disease, but in systemic disease as well. The same is true in the female, with chronic infection in the cervix. When such conditions are found they must necessarily be treated as possible foci of infection.

In addition, it is extremely important to make sure there is no ureteral obstruction such as a stricture, kink, volvulus or stone, and if such is found dilatation must be carried on regularly. In such cases and in only these should the procedure of renal lavage be carried out. Such lavages should only be done by the gravity method. The writer is not in accordance with those who treat kidney infections every day or every few days by the process of lavage. This is certainly not conservative medicine and it is to be discouraged.

Differential function tests are important in all of these infections. If the infection, for example, is limited to one kidney and if the function remains almost absent in the infected kidney over a considerable period of time, nephrectomy most naturally is indicated. However, in acute infections with the streptococcus or staphylococcus, nephrectomy should be the last thing to consider in the treatment. Most of all these cases, it is to be remembered, will clear up with persistent treatment. In addition to the removal of foci of infection, streptococcus infection responds rather well with the use of Serenium. Four of the 0.5-gramme tablets are necessary, however, and do much better work than when three daily are used.

III. Staphylococcus.

The same may be said of staphylococcus except as to the drug used in the treatment. Hexylresorcinol is used in this infection because of its power to free the urinary tract of this organism. It is used in doses as high as 9 to 12 capsules daily. The fluid intake during this treatment must be limited to at least four glasses daily. Hexylresorcinol does its work by a process of surface tension and consequently if the urine is too diluted by a large intake of fluids the desired result will not be accomplished. Hexylresorcinol, while useful in staphylococcus infection, by the writer has been found of very little value in any other type of urinary infection.

IV. Tuberculosis.

In any paper such as this, covering the more common urinary infections, considerable space should be given to the subject of urinary tuberculosis, particularly renal tuberculosis. Tuberculosis of the urinary tract is far more common than is generally believed. It is one of the most frequently overlooked diagnoses in urological infections. The symptoms are often misleading. It is true that occasionally the very first symptom of renal tuberculosis will be a slight increase in micturition as well as a symptom of having to arise more often than usual at night to void. We should bear in mind however, that when frequency occurs there is already some bladder irritation or we would not get this symptom. This means that by this time the infection is not limited to the kidney, but is in the bladder as well. Frequently the earliest symptom of tuberculosis of the kidney is backache. In three cases readily recalled to mind the symptoms were very confusing with those generally produced by a ureteral obstruction such as stone. It is possible that tuberculous pyelitis or ureteritis in these cases produced enough sloughing to become a cause of the ureteral obstruction. In other words we are not going to find kidney tuberculosis unless we constantly keep it in mind and constantly look for it. Practically all cases of renal tuberculosis have pus cells in the urine and frequently blood cells. Bearing out the statement made in the beginning of this paper, all urines showing pus cells, excluding, of course, Neisserian infection, should be cultured. Tuberculosis is one infection, which, of course, does not show anything in the culture tube. It should be remembered that a sterile culture on such a sample is presumptive evidence of tuberculosis. At this point the physician and the bacteriologist should work together. All cases, for example, under the urological service at the Geneva General Hospital which definitely show pus in the urine giving a sterile culture are routinely examined by the staining method for tubercle bacilli. In such cases, if it is impossible to find tubercle bacilli microscopically, the guinea-pig test is then used. As previously stated, the guinea-pig test is not the routine procedure to use, recalling that not all strains of tubercle bacilli grow in the guinea-pig. I am sure that by following out this routine, we have run across and made many diagnoses of renal tuberculosis which would otherwise have been overlooked. It is not at all uncommon to find cases of renal tuberculosis that give a history of having taken hundreds of capsules or tablets of various sorts, simply because they were treated symptomatically, no culture or further examination ever having been made.

It occasionally happens that the urologist spots the diagnosis of tuberculosis during the course of a pyelographic study. We definitely see a leakage at the tips of the calyces into the parenchyma. We may also find a certain amount of calcification in a kidney which may be due to tuberculosis. The point I wish to emphasize is this: a pyelogram may give us a clue upon which to work to further prove the presence of tuberculosis in a kidney. However, it should still further be emphasized that if the diagnosis of tuberculosis can be made without a pyelogram certainly a pyelogram is not to be done in these cases. If we find in the ureteral samples evidence of tuberculosis and if we also have the function

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of the two kidneys, what more is there to be gained by pyelography? Pyelography is dangerous in tuberculosis and if any contra-indication exists this is certainly one. Again let it be stated that pyelography as a rule is not necessary to arrive at a conclusion in this diagnosis.

It might be of interest to discuss briefly the probable cause of tuberculosis of the kidney. About two years ago the writer, in preparing a paper devoted entirely to renal tuberculosis, wrote to fifteen of the largest tuberculosis sanatoria in the United States asking them the question regarding the percentage of urinary tuberculosis as it occurred in their cases of pulmonary tuberculosis. Some reported one half of 1 per cent., others 1 per cent. and in no case was it more than 2 per cent. In fact, the average was slightly less than 1 per cent. Should we not therefore rule out the fact that renal tuberculosis is a complication of the disease? Indeed we should. Kidney tuberculosis is a separate and distinct clinical entity. It has been interesting to review a rather large number of cases of kidney tuberculosis. It is surprising in the histories to note the large number that have used milk freely and in most cases the unpasteurized milk. We certainly know that in nearly all herds of cattle sooner or later tuberculosis will be found, but until they are found, the consumer of the milk, whether it is Grade A or X, has a splendid opportunity of acquiring the infection. This is perhaps not true in all cases by any means, but it is possible that this is the most frequent source from which tuberculosis of the kidney is acquired.

The treatment of tuberculosis of the urinary tract depends entirely on the way we look at it. The trend of therapy, however, is gradually turning to the medical rather than to the surgical. If we consider all cases of tuberculous kidney as potentially being a bilateral infection we will most certainly discard surgery. In the vast majority of cases kidney tuberculosis is potentially bilateral. If the infection is only found on one side, this is no sign that it is not beginning in the other. Consequently, why should we remove a kidney of this type?

There are, on the contrary, certain exceptions. For example, if a kidney is practically totally destroyed from tuberculous infection, if its function is practically *nil* and if it is a source of danger, then and only then should a nephrectomy be done. If the reasonably early bilateral cases are curable by medical treatment, why should unilateral cases be treated any differently?

It was Sir William Osler who taught us forty years ago that rest was an important part of the treatment for this malady. This has not changed. However, more than rest is necessary. The medical treatment of renal tuberculosis demands rest most naturally. It also demands the steady use of the fortified cod-liver oils, also a good sensible diet rich in vitamines and at least two or three weekly general body radiations with ultra-violet lamps. Some authorities believe that the pure ultra-violet rays are more beneficial in certain types of tuberculosis than sunshine because, as they believe, infra-red rays in certain cases are harmful. Sunshine, of course, has a very high percentage of infra-red with only about 2 to 4 per cent. of ultra-violet rays.

SUMMARY.

The key-note that I have tried hard to emphasize in this paper is that we must use more conservatism in the treatment of urinary infections, but much less conservatism in their diagnosis. In most gatherings made up largely of general practitioners you will most always see physicians pull out of their pockets some kind of note paper and pencil when the speaker gets to the point of mentioning treatment. In most cases they have not taken a single note regarding the diagnosis which is by far the more important item. This is perhaps a habit which has come down through the various generations. The mystery of medical treatment attracts this sort of thing. However, I am trying to picture that in infections of the urinary tract this is definitely a different story. The finding of pus in the urine does not mean to reach for the bottle containing the cystitis tablet, but it does mean that the patient with this finding may have something very seriously wrong with him and treatment is not even to be considered until the diagnosis has been positively made by one who has had training in this field of work.

When we consider that there are four principal types of infection, we can easily see because of their entirely different lines of treatment that the diagnosis is the important thing to consider first of all. On the whole the results in all of these infections are most satisfactory when they are properly treated, and the entire purpose of this paper is to summarize the diagnosis as well as the treatment of these more common urinary infections.

Some Neglected Symptoms in Acute Abdominal Disease.

By V. ZACHARY COPE, B.A., M.D., M.S., F.R.C.S.

(Abstracted from the *British Medical Journal*, 18th July, 1931, p. 94.)

ABDOMINAL disease, whether acute or chronic, is diagnosed by considering three groups of observations. In the first place, local anatomical changes are detected by inspecting with the eyes or *x*-rays, feeling with the fingers, or even by listening with the stethoscope; secondly, perversions of physiological function are deduced from certain symptoms indicative of visceral derangement or by carrying out certain tests which betray pathological changes in the abdominal organs; thirdly, when the disease is serious and is influencing the whole organism, note is taken of the great bodily systems, especially the circulatory, respiratory, metabolic, and excretory systems.

In chronic abdominal disease the slowness of the process allows time for compensation to occur; the slight physiological changes are masked or neglected until gross anatomical alterations may attract the attention of the observer, or the general bodily depreciation may be obvious to the patient and his friends. In acute abdominal disease physiological derangement plays a much greater part; rapid changes due to violent stimuli delivered without warning are the rule, and the need for immediate compensation of the vital systems is all too frequently unsatisfied; while gross anatomical changes either are absent or appear only at a comparatively late stage in the course of the illness. Unless these facts are appreciated diagnosis becomes haphazard and unscientific.

SIGNS AND SYMPTOMS OF SHOCK.

It is well, therefore, to consider in the first place that symptom which is fairly common but still misinterpreted and ill-understood—that is, shock. When a sudden internal hæmorrhage occurs, or when a very violent visceral stimulus is applied, the direct or reflex disturbance of the circulation leads to that clinical picture which is generally known as shock—cold extremities, subnormal temperature, pallor, sweating, a rapid and small pulse, and a lowered blood pressure. With a person who has been in good general health previously, however, compensation soon occurs, the circulation is soon re-established, and the observer finds it difficult to believe in the existence of any serious condition. Neglect to realize the wonderful compensatory mechanism of the circulation accounts for this misunderstanding.

Quite as serious is the failure to note minor degrees of shock. Shock is a clinical condition, and should not be defined too rigidly. When all the classical symptoms are present shock must be accounted extreme, but it may be present even when some of the symptoms are absent. Serious clinical shock may be present without pallor, without much increase in pulse rate, without much lowering of blood pressure; very seldom, however, does the temperature fail to be subnormal. Only when the diminution of blood volume becomes too great for the vaso-constriction to bring up the pressure to normal will the sphygmomanometer record a fall; but before that stage is reached the smaller blood volume may

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lead to diminished metabolism, lowered temperature, sweating, and other general symptoms. It is well in acute cases to take the blood pressure several times. It will then be seen that it may fluctuate rapidly, and that one record may give misleading information. Instability of blood pressure is characteristic of those degrees of shock which fall short of the full picture.

In the case of a perforated ulcer of the stomach or duodenum a greater or less initial degree of shock is generally present, but compensation occurs inversely as the violence of the injurious stimulus. With a small leak shock is almost absent; with a large one it may be extreme, and go on to a fatal result; with intermediate cases it is moderate and fairly soon recovered from. Its occurrence is even denied by some authorities in all cases; but a subnormal temperature, cold extremities, a sweating skin, and a pallid face are enough to diagnose clinical shock, and these are usually present for a time.

IMPORTANCE OF SPHYGMOMANOMETRY.

The estimation of the blood pressure is too frequently neglected in other cases. Particularly is this the case in intestinal obstruction. The constant vomiting and direct effect of the toxins lead to a great fall in blood pressure. Unless this is carefully measured the capacity of the patient to undergo any operative procedure may be woefully miscalculated. With a blood pressure under 100 mm. Hg. (systolic) it is seldom expedient to give a general anæsthetic. More important to recollect is the fact that the systolic pressure may be fairly high, but the difference between the systolic and diastolic small. This difference, representing the pulse-pressure which maintains the circulation, may be quite small, even though the systolic pressure may be approximately normal. I have recorded a case of intestinal obstruction in which the systolic pressure was 135 and the diastolic 110. This patient was in the last degree of collapse, and I gave it as my opinion that he would hardly stand enterostomy—an opinion which was unfortunately verified. You will note that the systolic pressure was maintained though the blood stream was dependent on a difference of pressure of 25 mm. of mercury for its propulsion.

PAIN.

When we come to consider the symptoms due to physiological derangements pain is the most important. Indeed, it is often possible to diagnose a case merely by considering the type, intensity, and position of the pain. Too often, however, pain is inquired after in a very general sort of way, and important points are omitted. I will give some examples.

In the first place, help is gained by noting the shifting of the position of the pain. The best and most common example is that of appendicitis. The initial epigastric or umbilical pain is followed by the complaint of pain or tenderness in the right iliac fossa. This sequence is nearly always found in a first attack, but may be and generally is absent in later attacks. With a retrocæcal position of the appendix the initial epigastric pain is often absent. The epigastric-right-iliac sequence in a young adult or child nearly always signifies appendicitis, but in older persons greater circumspection is needed in diagnosis. A leaking duodenal ulcer or an attack of acute pancreatitis may give rise to similar, though usually more severe, pains. The shifting of the pain with a perforated ulcer is usually characteristic. At first severe and epigastric, it is followed by general hypogastric pain and tenderness.

In cases of peritonitis arising within the pelvis diagnosis may be difficult at first, but the pain gradually shifts upwards as the inflammation ascends, and the distension of the bowel is noticed at a higher and higher level.

Severe loin pain due to passage of small stone or gravel down the ureter is frequently accompanied by pain felt in the iliac fossa. If there is doubt as to the diagnosis (that is, whether appendicitis is the cause) help is gained by noting if the site of the pain tends to move downwards, as it often does with ureteric colic.

In cases of pancreatitis the initial devastating pain is followed by a more lasting pain and tenderness in both loins. If this pain were unilateral renal inflammation would naturally be suspected, but taken along with the character of the initial pain the bilateral loin pain is almost diagnostic of acute pancreatitis. It is merely a local pain due to the reaction round the swollen tissues of the gland, which, as we know, spreads its tail and head into the left and right loin just below the level of the last ribs.

Superficial Hyperæsthesia.

Superficial hyperæsthesia is often present in acute abdominal disease and is occasionally of considerable value in diagnosis. It is folly to attach too much importance to it, however, for the same area of hyperæsthesia can be produced by various intra-abdominal lesions. Yet every symptom is to be investigated, and I am sure that this is sometimes neglected. In young people the right iliac triangle is confirmatory of appendicitis, while in older persons it is only found with that disease or salpingitis. The bilateral triangle may accompany hypogastric peritonitis, and occasionally is found before any obvious peritonitis has been set up by an appendicitis.

The narrow band of hyperæsthesia above and parallel to Poupart's ligament is commonly present in subacute and subsiding appendicitis, but may also accompany pyelitis, salpingitis, or even cholecystitis and perforated duodenal ulcer. It is due to irritation of the parietal peritoneum in the corresponding iliac region. In any case of doubt between a thoracic and an abdominal lesion the finding of iliac hyperæsthesia weighs down the scale on the side of an abdominal lesion. This alone would make it worth while to test for hyperæsthesia in every case.

Referred Pain.

Of much greater value in diagnosis is pain that is felt outside the abdomen. Most of these pains are well known, so that everyone is aware of the site of pain due to colic of the small intestine, large intestine, uterus, or renal pelvis. But it is not generally known that disease of the appendix may cause pain in the testicle either of the same or the opposite side. This is an added difficulty in differential diagnosis, and one that may lead and has led to mistakes. The referred pain of biliary colic is usually felt in the right subscapular region, but mistakes may result if one is ignorant of the fact that the pain may be felt anywhere in the zone of distribution of the eighth or ninth thoracic nerve. I have seen cases in which all the severe pain of biliary colic was felt in the left side of this zone.

Phrenic Shoulder Pain.

That referred pain which I have found of most use in difficult abdominal cases is phrenic pain. Though I and a few others have been teaching the importance of this pain for several years the current textbooks make little or no mention of it, and certainly few make proper use of this symptom in their practice. I shall therefore dwell longer on this subject.

Phrenic referred pain is that pain which is felt on the top of the shoulder as the result of an irritative lesion in the region of the diaphragm. The phrenic nerve is made up of fibres from the third, fourth, and fifth cervical nerves, and the referred pain is felt in the region of distribution of the third and fourth, but chiefly the fourth, nerves. That area comprises the supraspinous fossa, the acromion and clavicular regions, and the subclavicular fossa. The loose way in which patients and doctors speak of the shoulder region when they actually mean the scapular or subscapular areas makes it necessary to specify top-of-the-shoulder or tip-of-the-shoulder pain.

The intensity and nature of the pain vary considerably. It may be so severe as to feel like a nail being driven in on top of the shoulder, or, on the other

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hand, may be so slight that the patient will not make any spontaneous complaint, and when asked about the pain will merely say that he had a pain in the shoulder which he put down to rheumatism. In a few cases the pain is felt in the deltoid region, and I have seen others where the patient stated that the muscles felt weak in that part.

Irritation of the right or left side of the diaphragm causes pain which is limited to the shoulder on the corresponding side; that is admitted by all. Inflammation in the middle part of the muscle may cause bilateral shoulder-top pain. In my experience there is also a further localizing value in this symptom, for I have found it a general rule, with few exceptions, that an affection of the anterior or posterior part of the diaphragm causes pain on the front or back part of the shoulder. For example, irritation of the anterior fibres of the muscle will cause pain in the clavicular region, while an affection of the crura will lead to local pain in the supraspinous fossa. There are few exceptions to this important rule.

Subdiaphragmatic Conditions.

Phrenic shoulder pain is of the utmost value in fixing the site of many acute abdominal disorders. Scarcely a week passes that I do not find it of the greatest assistance. In the last fortnight it clinched the diagnosis in two cases—a ruptured spleen and an acute pancreatitis. I will indicate the class of case in which it is generally or occasionally present. There are two groups which we must distinguish. First, those diseases which originate in organs which are in relation with the diaphragm. Secondly, those conditions which arise in other parts of the abdomen but may affect the diaphragm secondarily.

The first group comprises diseases of the liver and gall-bladder, duodenum and stomach, spleen, pancreas, and, rarely, kidney. The most common disorder which gives rise to it is perforation of a gastric or duodenal ulcer. Phrenic pain occurs in about two out of every three such cases. In the case of duodenal ulcer the pain is most commonly felt in the right supraspinous fossa, as might be expected when we remember that the irritated part will be the right crus and contiguous part. Here I cannot help speculating on the reason for the origin of a curious error which has been and is being perpetuated from one textbook to another. It is stated with monotonous regularity that the pain of biliary colic is often felt on top of the right shoulder. Anyone who has observed his cases carefully over a number of years knows that, though such a reference of pain is possible, it is of the greatest rarity. Nearly every case of severe right hypochondriac pain associated with pain on top of the right shoulder is due to a leakage of a duodenal ulcer. Though I have known this for more than ten years yet on a few occasions I have discussed the diagnosis of a case with a practitioner and come to the conclusion that the rare exception of biliary colic with shoulder-top pain had at last turned up. In every case when I have operated later I have found a leaking ulcer. The writers who described shoulder-top pain in connection with biliary colic put their views to paper before the surgery of acute abdominal disease had started, and I think that the error arose from mistaking the local leaking of an ulcer for gall-stone disease. If shoulder-top pain does occur with gall-stone disease it is almost always due to the onset of peritonitis which irritates the contiguous diaphragm.

With perforated gastric ulcer the pain is more often bilateral or felt on the left side. Occasionally it is limited to the clavicular region.

Tropical abscess of the liver is uncommon in Great Britain, but phrenic shoulder pain is very common as an accompaniment of such an abscess. As a matter of interest it was through observing liver abscesses in Mesopotamia during the war that I was led to study the significance of pain referred from the diaphragm. When the symptom is present it signifies that the liver is adherent to the diaphragm and that the abscess is threatening to break through into the thorax. It is most often felt in the right supraspinous fossa, since abscesses usually affect the posterior part of the right lobe.

The occurrence of left shoulder-top pain in connection with ruptured spleen is sometimes known as Kehr's sign. It is due to the irritation of the muscle caused by the effused blood.

Though it may not be accounted a surgical condition there is no harm in remembering that an infarct of the spleen may also be accompanied by phrenic shoulder pain.

Rarely acute pancreatitis may be accompanied by pain on top of the left shoulder localized to the supraspinous fossa. I have already mentioned a recent case that I have seen. I have seen one other similar case, and know of several more.

Very rarely perinephritis may irritate the diaphragm sufficiently to cause referred pain, but it is so rare and inconstant as to be of no practical value.

Pelvic Conditions.

When we come to consider diseases originating away from the diaphragm the most important is ruptured ectopic pregnancy. The occurrence of shoulder-top pain in this condition has long been recognized, but its full significance is still far from being realized. The pain is due to the liquid blood flowing up to and irritating the diaphragm. It is a matter of chance whether the blood irritates the anterior or posterior part of the muscle, and so the position of the pain may be clavicular or supraspinous. There are few pathognomonic symptoms in surgery, but this can be regarded as a near approach—that is, severe collapse and hypogastric pain unattended by abdominal rigidity, but accompanied by pain on top of one or both shoulders, indicate a ruptured ectopic pregnancy or bleeding from a ruptured Graafian cyst. Even this well-established fact is not widely known. When peritonitis which has its origin in any part of the abdomen reaches up to the diaphragm it may irritate sufficiently to cause shoulder pain. As a rule, if such a case comes to necropsy there will be found one or more plaques of plastic lymph between the liver and the diaphragm. This is more common on the anterior aspect, so the referred pain is more likely to be in the clavicular region.

I would not have anyone think that the phrenic shoulder pain is ever to be relied upon to the exclusion of other symptoms, for the diaphragm has an upper as well as a lower surface, and thoracic disease may irritate this upper surface. That is only one more reason for making a thorough examination, so that no localizing sign may be omitted. It is worth mentioning that pain from diaphragmatic pleurisy is more commonly felt in the clavicular and subclavicular area.

MUSCULAR RIGIDITY.

I now come to the symptoms produced by the reflex rigidity of the muscles which bound the abdominal cavity. There should be little need to mention rigidity of the anterior and lateral abdominal muscles produced by peritonitis, since it is familiar to everyone who has seen half a dozen cases of acute abdominal disease. But it is not yet general knowledge—nay, it is often overlooked by the elect—that extensive peritonitis may exist without any rigidity at all.

At the risk of repeating what we all may know already I would point out that irritation of the internal lining of the abdominal cavity is responded to by a greater or lesser degree of rigidity of the muscles which wall in the cavity. There is a large area comprising the pelvic cavity and the median part of the posterior abdominal wall which is *relatively* insensitive or silent when stimulated, giving rise to no rigidity of the overlying or underlying muscles. It is very common to have early pelvic peritonitis without any muscular rigidity. Another fact which is overlooked is that old people with weak muscles and easily tired reflexes frequently show little or no rigidity with peritonitis.

Muscular rigidity of the deep-lying muscles is easily, and I think commonly, neglected. When the diaphragm

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is immobile on account of overlying inflammation we cannot always have an *x*-ray apparatus handy to show that it does not move on respiration, but we have an easy clinical test. If the abdomen is retracted with inspiration the midriff must be relatively immobile and is probably inflamed. This reversal of the abdominal wall movement is significant.

Psoas rigidity due to appendicitis or similar inflammatory condition in the vicinity is shown either by flexion of the corresponding thigh or by slight pain on moving the thigh. Slighter degrees may be detected by extending the thigh on the abdomen and noting if it causes pain.

It is seldom that the obturator muscle becomes rigid as the result of peritonitis, since the dense obturator fascia does not readily permit the inflammatory process to pass; but occasionally putting the obturator muscle on the stretch by inverting the flexed thigh will elicit pain and denote some overlying inflamed focus which is penetrating and affecting the muscle.

There is another little test which may be of some value in fat subjects with a suspected inflammatory mass in the region of the iliac fossa and vessels. If the fingers be pressed on to the femoral artery in Scarpa's triangle so as to stop the circulation in the limb, the extra pulsation in the iliac vessels as the result of the block may cause an increase of pain when the inflammatory focus is in contact with the vessels. This femoral test would only be of real use in very fat people, who are notoriously difficult to investigate.

Gross anatomical derangements, with the exception of torsion of viscera and strangled external hernia, are not often obvious in the early stage of acute abdominal disease. The presence of free fluid and free gas displaces and masks the parts, but usually at too late a stage to be of much practical value.

CONCLUSION.

The diagnosis of acute abdominal disease is a fascinating art which may be almost made into a science by attending carefully to the manifold symptoms to which it gives rise. The problems greatly differ from those in chronic abdominal disease. The combat against disease is in the one case a siege and the other a battle, and different qualities are required for success. In the acute disease early appreciation of the menacing forces is essential, and success may sometimes be gained by paying attention to small points which would in a chronic disease be regarded as trivial. In no other class of case is time of such importance, laboratory assistance of so little use, and the opportunity for acute clinical observation so well provided. Though disappointment comes but too often, the reward of paying attention to some of the neglected points which I have mentioned is an increasing number of successful diagnoses, and, what is even more important, an inward sense of something logically attempted, something reasonably done.

"Avertin" Anæsthesia in Neurologic Surgery.

By WALTER E. DANDY, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. XCVI, No. 22, 30th May, 1931, p. 1861.)

ETHER, administered by inhalation, has three serious liabilities in intracranial surgery. It causes (1) swelling of the brain, (2) post-operative vomiting, and (3) pneumonia. Together, these three effects are alone responsible for quite a high percentage of the mortality associated with operations on the brain.

Doubtless much of the swelling of the brain results from venous cerebral congestion incident to respiratory embarrassment during induction, but the direct irritating effect of the ether on the brain is also probably an important factor. Although the degree of swelling of the brain is variable, it is always present and is always an added hazard. Occasionally it may be so extreme as to resemble the pressure of an intracranial tumour and prevent closure of the dura and replacement of the bone flap. For operations beneath the surface of the brain, such as for hypophyseal, pineal, cerebello-pontine, olfactory-groove and other tumours, sufficient exposure for careful extirpation of the growth is attainable only by making a much larger bony defect or by sacrificing contiguous brain tissue. Cerebral swelling not only always makes the operative procedure in varying degree more difficult and more dangerous, but it may even prevent its successful conclusion.

Post-operative vomiting has been one of the most serious causes of mortality in cranial surgery. Although the operative field is always dry before closure is begun, the straining that occurs with vomiting on awaking from the anæsthetic produces venous stasis and reopens vessels that otherwise would remain sealed. Cerebral hæmorrhage of varying grade is the result. If the veins are large or if there is a free space or open ventricle into which hæmorrhage may continue unrestrained, the size of the hæmatoma may cause death; if of lesser grade, convalescence is prolonged and perhaps the after-result is less perfect.

Post-operative pneumonia, as a sequel of ether anæsthesia, is by no means an infrequent occurrence, especially in long cranial operations and, when present, the percentage of recoveries is small. In studying the cases of post-operative pneumonia after cranial operations I have been impressed with two facts: (1) Cerebellar operations are practically devoid of this complication, and (2) after cerebral operations, the pneumonia almost without exception is on the side that is dependent (the patient is always turned partly to one side). It is evident, therefore, that the position assumed by the patient during the operation plays an important rôle in the development of pneumonia and that gravity is an essential factor in determining the side involved. There can be little doubt that aspiration into the dependent bronchi is responsible for many cases, for a plug of mucus is frequently found occluding the affected bronchi; and in some instances, evidences of pneumonia—rapid respirations, tachycardia and laboured breathing—are present before the operation is concluded. There is also reason to believe that, when administered by the drop method, ether may not vaporize and may gravitate in liquid form into the dependent part of the lung and cause pneumonia without the development of an infarct from aspiration. Careful search for plugs in the bronchi is frequently negative. Unquestionably the incidence of pneumonia bears a direct relationship to the skill of the anæsthetist, both during the period of induction and throughout the operation; but even with the best anæsthetists, pneumonia cannot be eliminated. Doubtless one of the important reasons (in addition to posture) for the absence of pneumonia in cerebellar operations is the administration of ether in vapour form by means of a pump. The direct ingress of liquid ether into the nasopharynx and subsequently into the lungs is thereby avoided. There is, of course, no reason why vaporized ether should not be similarly used in cerebral cases and thus reduce the incidence of pneumonia.

To avoid the foregoing dangers, two substitutes for ether by inhalation have been quite generally adopted in cranial surgery in recent years—local anæsthesia and rectal ether. The former eliminates all the risks of ether. But, at best, it is a dreadful ordeal for a patient to endure for the two, three or even more hours necessary to complete the operation; and only too frequently the exhausted patient and operator as well are only too anxious to have recourse to general anæsthesia. Rectal ether is a great advance over ether by inhalation, and in large part, but by no means entirely, avoids all three of the major risks of the latter.

During the past year I have almost exclusively used "Avertin" anæsthesia, given rectally, for all major operations on the brain and spinal cord. After a cautious beginning because of the adverse reports from Germany, where many serious results followed the pioneer efforts, it was soon learned that not only were

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all the liabilities of ether entirely eliminated but every advantage of local anæsthesia was also obtained. In other words, there has never been an instance of post-operative pneumonia and on very few occasions has there been post-operative nausea or vomiting. During this period, in which upward of 250 major cranial operations of every type have been performed, there has been no mortality due to the anæsthetic, no instance of post-operative pneumonia, and no deleterious effect either immediate or remote.

Owing to the entire absence of swelling of the brain it has been possible to modify greatly the magnitude of the cranial exposure through which certain tumours of the brain are removed. This is notably true for extirpation of hypophyseal tumours; the size of the bony defect is reduced about one half and without sacrificing the room that is so important for exposing and removing the tumour. Not only is the hypophyseal operation easier of performance, but also the frequent injury to the Rolandic area with resulting convulsions and hemiplegia following the larger cerebral exposure is always avoided. Moreover, the danger of extradural hæmorrhage, so common with the more extensive operation, is eliminated.

In the approach to all intracranial tumours the same benefit, in perhaps a lesser degree, obtains. It is known beforehand that an extra allowance of bony defect will not be required to compensate for an increased volume of brain due to the effects of the anæsthetic. In no procedure has "Avertin" been of such paramount importance as in my cerebellar approach for partial section of the sensory root in trigeminal *tic douloureux*. The anæsthetic has made it a far simpler operation because the absence of swelling of the cerebellum uniformly provides adequate room. The trigeminal operation and others to a lesser degree are greatly facilitated by the perfectly smooth and even respirations—almost a perfect sleep—that follows "Avertin" anæsthesia. Under ether, the respirations may be promptly stimulated by a new draft of ether vapour striking the nasopharynx; or the depth and rapidity of the respirations vary with the degree of anæsthesia. Irregular respirations, particularly with straining, seriously deter the operator in the one brief moment when perfect vision and touch are required to section partially the sensory root.

The complete removal of cerebello-pontine tumours, among the most tedious, difficult and dangerous operations and requiring the most painstaking care at every step, is especially facilitated and made safer because of the smooth regular respirations and the absence of cerebellar œdema.

From the patient's point of view, "Avertin" anæsthesia is almost ideal. Within five or ten minutes after its introduction by rectum, the patient is in a sound, peaceful and seemingly natural sleep. There has not been the slightest unpleasant sensation; there has scarcely been a movement of any part of the body. Moreover, the patient awakens gradually and rarely with any nausea or vomiting. The duration of loss of memory is several hours, frequently much of the day of the operation, thus tiding over the most uncomfortable post-operative period. Nervous patients are frequently given "Avertin" in the room and are back again when awakening. Owing to the long duration of the anæsthetic effects, all necessary shaving of the head may be done after the administration of the anæsthetic. It is thus possible for the patient to have no memories of the operating room. How far these points of finesse are advisable depends on the probable reactions of the individual patient, but they are possible without additional risk. In no instance has there been any rectal discomfort from the "Avertin."

"Avertin" is by no means a fool-proof anæsthetic, but it is perfectly safe if used with good judgment. The dangers have been fully enumerated by a number of German surgeons who pioneered in its use. But there can be no doubt that their mortality rate has been due to overdosage, which in turn has been due to the effort to induce anæsthesia with "Avertin" unsupported. This is neither necessary nor advisable. The susceptibility of different individuals to the effect of "Avertin" varies too much to produce maximum anæsthesia safely by "Avertin" alone. And, once given, the "Avertin" is rapidly absorbed and beyond control. To obtain the best results with safety, an average dose should be given and any remaining deficit in the anæsthesia may be overcome by supplementing a local anæsthetic, ether by inhalation, or nitrous oxide. The amount of supplementary anæsthesia, if necessary, is very small and does not change the basic character of the perfect anæsthesia. For these reasons it may perhaps be preferable to look on "Avertin" as a basal anæsthetic; but since the anæsthesia retains unchanged the full character and effects of the "Avertin," this is a question of academic rather than practical interest. A safe dose of "Avertin" for a normal healthy individual is from 90 to 95 mg. per kilogramme of body weight. Rarely is a greater dose given and never more than 100 mg. per kilogramme. Smaller doses are given when the general condition of the patient is less than normal. For an ill-nourished individual, a dose as low as 50 or 60 mg. per kilogramme may be adequate for complete anæsthetization. Hence it is clear that each patient must be estimated individually.

I have found no conditions that contra-indicate "Avertin" when a general anæsthetic of fairly long duration is needed. Pulmonary lesions, chronic nephritis and hypertension are apparently not contra-indications. I have given "Avertin" for patients up to the eightieth year when ether would have been hazardous. In young children (under the age of 8 or 10) I have used "Avertin" more sparingly, still preferring ether because the induction period is short and the total amount of ether required is small. However, it seems probable that, with the increasing experience with the dosage in children, "Avertin" may in large part take the place of ether after the age of 3 or 4 years.

The only effect of "Avertin" that might be considered adverse is a drop in blood pressure, coming on within the first half hour and usually within fifteen minutes. This change may indeed be quite profound. In hypertensive cases a drop of 100 mg. of mercury has been observed. But the patient's general condition continues unchanged, the colour is good and breathing full and easy; and within a short time the blood pressure has spontaneously returned to the previous normal level and remains so during the remainder of the operation. The drop in blood pressure is therefore of no practical concern. It is, in fact, no longer considered necessary to support the blood pressure with epinephrine, which may or may not be effective. Before beginning the use of "Avertin," it was feared that the depressing effect on the blood pressure—the one best guide of the patient's condition and to the time at which operative efforts must be discontinued—might again develop and shorten the period of safety of the operation. Not only was this suspicion unfounded, for a secondary depression does not occur, but the actual period of operative safety is, I think, actually longer than with ether.

Dyspepsia.

By C. G. McDONALD, M.B., CH.M. (Sydney).

(Abstracted from the *Medical Journal of Australia*, No. 23, 6th June, 1931, p. 700.)

DYSPEPSIA or indigestion is a vague term, used by the patient to describe symptoms which he refers to a disturbance of the stomach. The physician's first task is to determine whether or not the stomach is at fault. Frequently symptoms attributed to the stomach have origin in causes external to this organ. Thus vomiting is frequently the first symptom in scarlet fever, and an unwary medical attendant may make a diagnosis of "acute gastritis" in a sick child, only to be confronted by a rash and sore throat on his next visit. The vomiting centre is highly irritable in many infective states

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and in those diseases associated with cerebral anæmia. Loss of appetite, nausea and vomiting are not uncommon in pulmonary tuberculosis. Pernicious anæmia is sometimes attended by serious vomiting. The "morning sickness" of pregnancy and the vomiting of uræmia are well known, though the mechanism by which the vomiting centre is irritated is but little understood. Vomiting due to cerebral anæmia occurs in coronary occlusion, heart block and cerebral tumour. Its frequency in migraine is attributable to ill-known temporary changes in the brain, possibly also of vascular origin.

Bearing the above points in mind, we are concerned only in this paper with the manifestations of indigestion in which the stomach and the neighbouring organs functionally associated with it are actually or apparently at fault so far as the physician can judge, and in which no other organ gives indication of antecedent disease. These disturbances of gastric function are usually classified into two main groups, organic and functional dyspepsia. The recognition of the group to which a particular case of dyspepsia belongs is the chief duty of the diagnostician. On it depends the patient's chance of relief from suffering and worry. Four methods of investigation are available: (1) evaluation of the patient's symptoms; (2) physical examination; (3) radiographical examination, and (4) biochemical analysis. Little good would be achieved within the limits of this space by a detailed discussion of physical diagnosis and the results of *x*-ray examination and gastric analysis. They will be mentioned in the second half of this article. Physical examination is an obvious essential and can never be omitted. Investigation by the radiographer and the biochemist are not necessary in every instance. Knowledge of symptoms, however, attains in this department of medicine a supreme importance. Without an adequate appreciation of the symptomatology of gastric affections no physician may hope to make the minimum of mistakes in diagnosis. It is therefore necessary to study the main symptoms of gastric disturbances in some detail.

SYMPTOMATOLOGY OF DYSPEPSIA.

Fullness.

The sensation of fullness or distension in the epigastrium has been experienced at some time or other by everyone. That it is not more commonly felt by persons in excellent health after a full meal is due to the plastic tonus of the stomach. The stomach has the power of accommodating itself readily to alterations in the bulk of its contents. By relaxation of the musculature of the fundus when the bulk increases and contraction when the bulk diminishes, the intragastric pressure is maintained at a more or less constant level. "Galloping" of food will cause fullness in normal persons because sufficient time is not allowed for relaxation of the fundus, which takes place slowly. Hence the intragastric tension is raised, and this rise of pressure causes reflexly a feeling of discomfort in the epigastric abdominal wall. Fullness, then, is an index of the rise in intragastric pressure or of the extent to which the muscle fibres are passively stretched; but since it is probably, like pain, a viscero-sensory reflex, it is not directly due to stretching of the musculature, but to the consequent irritation of the nerve endings in the stomach wall. It is frequently, but by no means always, associated with an increase in tone. When tone is excessive, the intragastric pressure may rise after a meal, owing to failure of relaxation, and when tone is deficient or absent the pressure may increase owing to tension of food on the gastric musculature which supports, so to speak, the "dead weight" of the stomach contents.

Fullness is a symptom common to organic and functional disturbances. The patient frequently ascribes it to "wind," possibly because the eructation of wind in small quantities may accompany it, but it is frequently independent of flatulence. When unaccompanied by pain, it is usually due to a functional disturbance of digestion. Occasionally mechanical interference with the elasticity of the stomach (as by great enlargement of the liver in malignant disease and cardiac failure, or of the spleen in myeloid leukæmia) may cause simple fullness. When associated with unmistakable and persistent pain, organic disease of the stomach is almost certainly present. The two great causes of pain and fullness are peptic ulcer and carcinoma.

Pain.

Pain arising from stimuli acting on the sympathetic nerve endings in the stomach wall (the sympathetic is known to supply the pyloric region, though definite anatomical evidence that it supplies the body of the stomach is lacking) is referred to that portion of the body wall which is in communication with the sixth, seventh, eighth and ninth thoracic sensory nerves. For some unknown reason it is felt chiefly in the vicinity of the final ramifications of these nerves and is thus referred to the epigastrium.

Epigastric pain is probably an exaggeration of the sensation of fullness. Many patients who complain of pain, state that it is preceded by fullness which increases in intensity until it becomes painful. It is thus attributable to extreme tension upon the musculature and therefore on the nerve endings of the stomach. It is not due to excessive hydrochloric acid, for hyperchlorhydria may exist without it, and experimentally acid may be added to the stomach without evoking the sensation of pain. Excessive secretion may, however, evoke pain in certain diseases by promoting spasm in the pyloric canal. Pain—definite, severe pain—is almost pathognomonic of organic disease. Unfortunately, patients sometimes describe as pain sensations which cause discomfort, but have not the severity or usual characteristics of pain.

Hunger pain is the typical symptom of juxta-pyloric ulcer. It arises when the stomach is empty of food, but contains highly-acid gastric juice. The acidity irritates the neuro-muscular mechanism in the vicinity of the ulcer, causing pylorospasm, which leads to extreme tension on the nerve endings and is therefore the immediate cause of the pain.

Flatulence.

Patients frequently complain of flatulence when they mean fullness, the frequent association of the two symptoms being responsible for the confusion. Any clinical disturbance of gastric function causes mild flatulence, probably because epigastric discomfort leads to reflex swallowing of air. Flatulence of marked grade is almost invariably due to habit, large quantities of air being swallowed consciously or unconciously (usually the latter), the consequent distension of the stomach causing fullness, which is relieved by the loud belching of wind, but reappears when more air is swallowed. Some particular article of food, such as potatoes, is usually blamed for this symptom, on the incorrect assumption that it is due to fermentation. Worried business men, and women in the climacteric are prone to it. Flatulence is seldom the main symptom of organic lesions, other symptoms, for example, pain, vomiting and fullness, being more characteristic of ulcer and cancer. Flatulence is, however, a common symptom of women afflicted with gall stones.

Vomiting.

Speaking strictly, all vomiting is central, since the mechanism is under the control of the centre in the medula. But it is customary to distinguish between central vomiting, in which the centre is irritated by interference with its blood supply or by circulating poisons, and reflex vomiting, in which the centre is stimulated by afferent impulses which may pass *via* the vagus alone or may take more complex nervous paths.

Vomiting is less frequently associated with disorders of the stomach than with causes arising external to that organ. Acute inflammatory conditions of the stomach,

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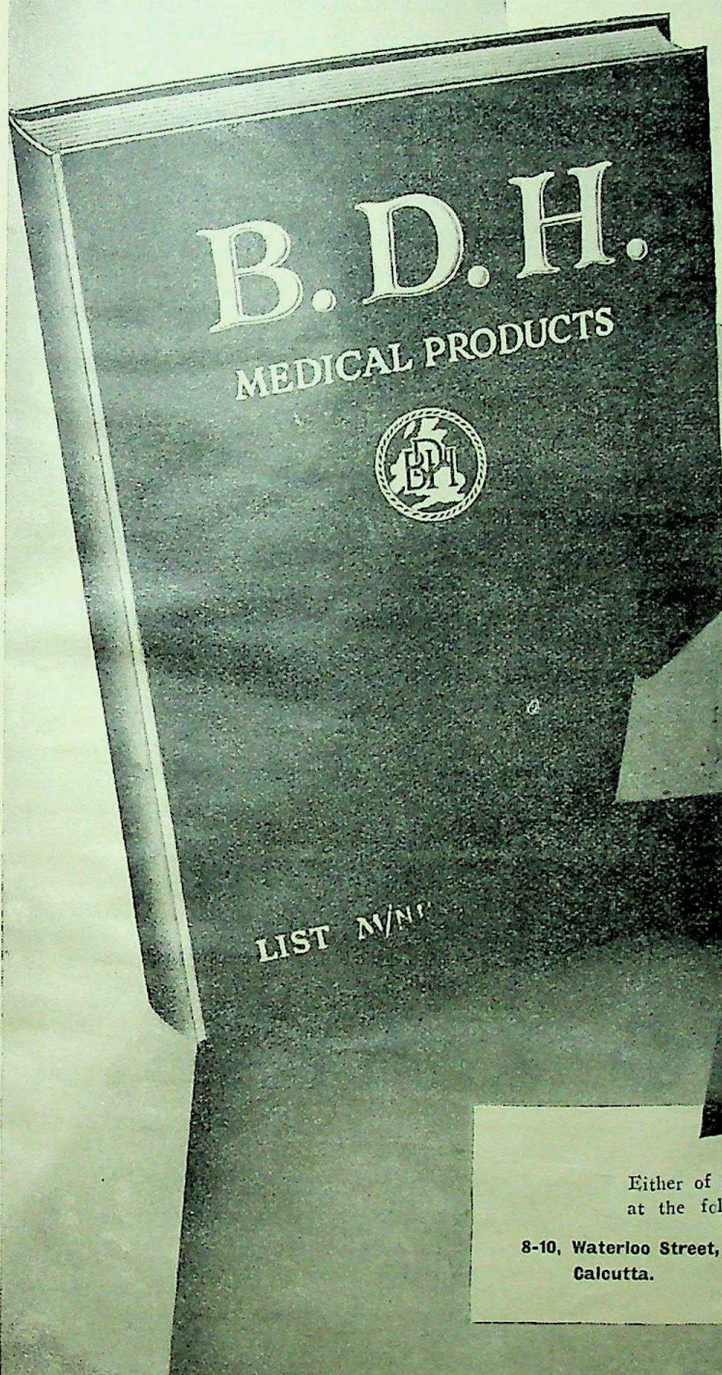

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which, except in children, are not common, cause vomiting, and it may occur in gastric ulcer without obstruction when pain is sufficiently great to evoke the stimulus. Early morning vomiting is a feature of chronic alcoholic gastritis. But persistent vomiting is most characteristic of pyloric obstruction (whether due to ulcer or to cancer, or to pyloric stenosis in children), and of hour glass contraction of the stomach. In purely functional disorders it is an uncommon symptom. Hysterical vomiting is unaccompanied by either nausea or pain. Occasionally neurotic patients make loud and ineffectual attempts to vomit, but only succeed in ejecting saliva.

Hæmatemesis and Melæna.

The commonest causes of profound hæmatemesis are gastric ulcer, duodenal ulcer, acute alcoholic gastritis and cirrhosis of the liver.

Acute gastric ulcer is a common cause, and when vomiting of much blood occurs in chronic ulcer it may be assumed that portion of the ulcer is in the active ulcerating stage, producing erosion of gastric vessels. The blood is frequently bright red. It has the so-called "coffee grounds" (dark brown) appearance only when it has remained in the stomach sufficiently long to allow conversion of hæmoglobin into hæmatin by the acid gastric juice. Symptoms seldom occur till the blood is actually vomited. The blood may fill the stomach very slowly, and the first indication of malaise may be the desire to vomit, followed by the ejection of a pint or more of blood. Thereupon the patient manifests the signs of shock and hæmorrhage (pallor, faintness, restlessness, and frequently, but not always, a rapid and weak pulse). Sometimes profuse hæmorrhage from an ulcer occurs without antecedent symptoms of dyspepsia, and the same remark applies to perforation. But the absence of previous symptoms should warn the physician not to assume that an ulcer is present without exhaustive inquiry into the patient's habits and general health. For example, a man, thirty-five years old, after an acute alcoholic bout lasting eight days, vomited a startling quantity of blood, which doubtless flowed from the engorged vessels of his inflamed gastric mucosa. Failure to elicit this history of alcoholism led to an incorrect diagnosis of ulcer. Again, a girl, just emerging from puberty, had a sudden severe hæmatemesis. The usual inquiries concerning fullness and pain after food failed to reveal a history of ulcer, but gastric ulcer was the diagnosis made. Later, a history of gradual loss of general health, with weakness, loss of weight and slight pallor was obtained, and a more careful examination led to the discovery of a considerable enlargement of the spleen. A correct diagnosis of Banti's disease with hæmorrhage from œsophageal varices was then substituted. Gastrostaxis or oozing from the vessels of the gastric mucous membrane without apparent ulceration is a term used to explain hæmatemesis in persons who have never had dyspepsia or other symptoms of disease, and in whom the *x*-ray findings are normal. Occasionally these patients die as a result of the hæmorrhage and a normal gastric mucous membrane is found *post mortem*. It is possible, however, that in many, if not all, of these instances more careful search would demonstrate erosion of a gastric vessel. Minute ulcers have been found after meticulous examination, when a less thorough search of the stomach wall revealed no lesion.

Duodenal ulcer is a less common cause of hæmatemesis than ulcer of the stomach and a more common source of melæna. When a patient suffering from dyspepsia vomits a large quantity of bright or slightly altered blood and passes through the rectum a small amount of dark blood, gastric ulcer may be suspected. When he vomits a small amount of dark blood and evacuates *per rectum* a large quantity of tarry stools the ulcer is probably located in the duodenum. Occasionally the blood passed is bright, owing to the extent of the hæmorrhage and the rapidity of its passage along the bowel. Small quantities of "coffee grounds" in the vomitus and of black altered blood in the stools are consistent with an ulcer located in either organ or with malignant disease of the stomach or with any one of the manifold causes of hæmatemesis and melæna. When hæmatemesis results from duodenal ulceration, the blood has regurgitated through the pylorus into the stomach.

Alcohol addicts may suffer from gastric hæmorrhage in two ways: first, by erosion of gastric vessels when the mucosa is engorged and inflamed by alcohol (alcoholic gastritis) and, second, by rupture of œsophageal varicose veins in which the pressure is raised owing to obstruction of the portal venous system (cirrhosis of the liver). Too frequently the latter diagnosis is wrongly made through failure to distinguish between a temporary and a prolonged lapse from sobriety. As the prognosis of portal cirrhosis points invariably to death, it is important to remember this distinction.

No attempt need here be made to mention the variety of diseases arising outside the alimentary tract which may be characterized by the vomiting or passing of blood. In the majority little difficulty in diagnosis will be experienced. Occasionally it is not easy to distinguish between gastric carcinoma and pernicious anæmia. Pernicious anæmia is a rare cause of hæmatemesis, but sometimes it is impossible in the absence of repeated and reliable blood counts to distinguish between the two. Both diseases occur at or after middle age, both are associated with complete achlorhydria, both cause pronounced pallor, and both may be accompanied by "gastric" symptoms, such as fullness, anorexia and vomiting.

Some mention, however, is necessary of the relationship of hæmatemesis to gastric carcinoma. A malignant growth is highly vascular and is likely to promote bleeding. But it spreads more by infiltration than by ulceration, and therefore erosion of vessels is less likely than in peptic ulcer. A profuse hæmatemesis is seldom caused by carcinoma. More often the blood is small in amount, and owing to its slow oozing from the vessels it is almost invariably "coffee grounds" in colour. The blood comes from the ulcerating surface of the growth, but the comparatively slow process of ulceration accounts for the rarity of profound hæmorrhage. Obvious melæna is as uncharacteristic of gastric carcinoma as it is characteristic of duodenal ulcer. More frequently it takes the form of "occult blood" in the stools.

Loss of Appetite and Loss of Weight.

A patient loses weight because he eats insufficient food, and he eats insufficient food because his appetite is poor. There are a few diseases (for example, diabetes mellitus, exophthalmic goitre) in which other factors than diminished intake of food cause wasting. But in general the patient who grows thin is he who is sparing of his food. Many mistakes have been made through failure to recognize this simple fact. For example, a man of forty-five years or more who complains merely of loss of weight is not necessarily a candidate for death. To tell him that with such a combination of symptoms cancer must be suspected is unjustifiably to frighten him. Business or domestic anxiety, overwork, excessive smoking or drinking, Cupid's dart or an ill-fitting tooth plate are a few of the multitudinous causes of loss of appetite and therefore loss of weight. That the subjects of cancer usually waste is not open to question. That they waste invariably is not true. It may be that cancer *per se* is responsible for some loss of weight, but in the main patients suffering from cancer of the stomach grow thin from inability to eat or to retain their food.

In peptic ulcer the appetite is usually good and often excessive and nutrition is therefore unimpaired. But wasting occurs when vomiting is a dominant symptom, as it is in pyloric stenosis, or when pain is so violent and unbearable that vomiting occurs or food is refused through fear of pain. It is therefore more common in the chronic advanced type of gastric ulcer. Anorexia and loss of weight are far more typical of gastric carcinoma. If the man of forty-five years or more, mentioned above, suffers from these symptoms, together with pain after meals, gastric cancer is the most probable

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cause. Functional disturbances of digestion frequently cause loss of appetite and weight of mild degree, but the loss of weight is rarely profound and may readily be repaired by correction of the dyspepsia and an abundance of food. Dangerous emaciation from sheer abhorrence of food occurs in hysterical young women who have failed to survive a severe emotional shock (anorexia nervosa). The history, the age of onset (puberty or soon after), the complete disinclination for food, the absence of temperature and failure to locate any organic lesion make the diagnosis comparatively easy.

Anæmia.

Gastric carcinoma is accompanied by definite anæmia of the secondary type. The occasional difficulty of differentiation between this disease and pernicious anæmia has already been mentioned. Although gastric and duodenal ulcer are said to be characterized by anæmia, the red cell blood count is seldom much below normal. The subjects of uncomplicated ulcers have a satisfactory colour. Any marked pallor may be attributed to recent hæmatemesis or melæna.

Acidity, Heart-Burn and Water-Brash.

Patients frequently use such vague terms as acidity, heart-burn and water-brash to describe their sensations. "Acidity" is a sour taste experienced in the mouth and upper end of the pharynx, due to regurgitation of gastric juice through the cardiac orifice. The mechanism consists in relaxation of the cardiac sphincter and reversed peristalsis of the stomach without diaphragmatic fixation or expulsive contraction of the abdominal muscles. "Heart-burn" is a sensation of heat or burning felt at the lower end of the sternum, frequently relieved by the ingestion of bicarbonate of soda. Like "acidity," it is also due to regurgitation. Frequently regurgitation takes place into the lower end of the œsophagus and thence into the mouth, and the patient complains of both "heart-burn" and "acidity." "Water-brash" is a vague expression used by patients to describe two different symptoms. One is merely excessive secretion of saliva. The other is pyrosis or true water-brash due to regurgitation of the acid contents of the stomach into the mouth. In this sense "water-brash" is the equivalent of "acidity."

All these symptoms are of little help in diagnosis. They are commonly present from time to time in normal persons and in those who suffer from functional dyspepsia. On the other hand, the subjects of organic gastric lesions may complain of them. More reliable symptoms and signs are then necessary for the diagnosis. Mention may, however, be made here of two interesting clinical facts. The first is that stasis of food in the distal end of the gullet causes reflex secretion of saliva, which, when swallowed, initiates peristalsis of the œsophagus and consequent propulsion of the bolus. This is called the œsophago-salivary reflex. In cardiospasm and in œsophageal cancer the frequent excess of salivation may be explained on this ground. The second fact of clinical interest is that there is sometimes notorious difficulty in distinguishing between a trivial gastric disturbance and serious myocardial disease, such as angina pectoris. A man of fifty years may complain of an attack of indigestion or "heart-burn." When questioned, he describes a sudden pain in the epigastrium, over the lower end of the sternum, or even over the lower precordial region, lasting a minute or two, associated with eructation of air, vomiting sometimes, palpitation, and a temporary feeling of air hunger. He ascribes these sensations sometimes to indigestion, sometimes to heart disease, according to his sensations; if chiefly pain, to the former, if palpitation and breathlessness, to the latter. There is some truth in the old aphorism: "When a man complains of his heart, look to his stomach; when of his stomach, look to his heart." The difficulty in diagnosis is minimized if the patient is observed in an attack, but this happens but rarely, and since physical examination of the heart reveals no abnormality in a large proportion of individuals, the physician may be required to give an opinion on symptoms alone. Unfortunately these patients often give an unsatisfactory account of their sensations. In general, however, when the emphasis is laid by the patient on breathlessness, pallor, precordial pain and consciousness of the heart's action, angina pectoris or even coronary thrombosis is the probable condition; when breathlessness is not a pronounced feature and there is no pallor, but much flatulence, "acidity," fullness and epigastric discomfort, relieved quickly by bicarbonate of soda, disturbance of gastric function is the more likely cause. No problem tests the physician's skill more than this distinction. This is one of the instances in which an electrocardiogram may help and not mislead.

CHIEF DISORDERS OF DIGESTION.

Gastritis.

"Gastritis" is one of the most ill-used words in medical nomenclature. It is frequently used as a term of convenience and in this respect is akin to "myocarditis." While gastritis is a true clinical entity, the diagnosis is made only too frequently in the absence of any evidence of inflammatory reaction in the stomach.

Acute gastritis may be caused by irritant poisons, alcohol and infection with micro-organisms. It is probably seldom (except in children) that it is due to non-infected food. When vomiting is followed by diarrhœa and is associated with rise in temperature (acute gastro-enterocolitis), or when vomiting in a previously healthy person is followed by jaundice and sometimes by diarrhœa (acute catarrhal jaundice), the diagnosis of acute gastritis due to infection may be obvious. Acute alcoholic gastritis is characterized by nausea and vomiting and sometimes by hæmatemesis. Difficulty only occurs when the patient denies the cause of his condition.

Chronic gastritis is a disease which should be diagnosed with caution. The two definite causes are alcohol and the continuous ingestion of irritant poisons. Repeated "dietetic errors" are said to cause it, but diet is the innocent scapegoat of many mistakes in medicine. The error is only too often in the diagnosis and not in the diet. Though chronic gastritis, pathologically considered, is said to occur secondarily to diseases of other organs, for example, pulmonary tuberculosis, congestive cardiac failure, cirrhosis of the liver, pernicious anæmia, there is little clinical interest in this form. Clinically there is the great danger of attributing to primary disorder of the gastric function symptoms which take their origin in changes external to the stomach. It is wise, therefore, to avoid the diagnosis of gastritis in these conditions.

In chronic gastritis the hydrochloric acid of the gastric juice is diminished or entirely absent (achylia gastrica), the gastric mucous membrane is atrophic, and frequently there is an excess of mucus in the stomach. The diagnosis depends usually on the history of ingestion of a chronic irritant, epigastric discomfort and flatulence, loss of appetite, vomiting, foul breath and constipation, and on the finding of the characteristic changes by gastric analysis.

Peptic Ulcer and Gastric Carcinoma.

The most individual, though not a constant, symptom of peptic ulcer and cancer of the stomach is pain.

Gastric ulcer is marked by periodicity of the pain, remissions of one or more months being frequent. A similar alternation occurs with less frequency in ulcer of the duodenum. In gastric ulcer the pain begins a quarter of an hour to two and a half hours after meals (the nearer its location to the pylorus, the later the pain) and is relieved by vomiting, but little or not at all by the ingestion of food. In duodenal ulcer pain begins as the stomach empties, and therefore appears two to three hours or more after a meal. When "hunger pain" occurs in the small hours of the morning the diagnosis of duodenal ulcer is suggested. The pain

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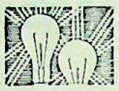
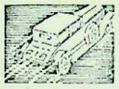
electric lights  to old oil lamps

and motor cars  to the

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is relieved by food and is unrelieved by vomiting. In both types of ulcer the pain is located in the epigastrium, with a tendency to spread to the left of the middle line in gastric ulcer and to the right in duodenal ulcer. Occasionally it is possible to demonstrate areas of cutaneous hyperæsthesia in these regions. When the pain of gastric ulcer gradually increases in intensity, becomes more or less continuous, and is now felt not only in the epigastrium, but also in the lower thoracic region of the back, it is justifiable to infer that the ulcer has penetrated and eroded the pancreas. Vomiting, especially at the height of the pain and giving immediate relief, is common in gastric ulcer. In duodenal ulcer vomiting is rare, unless pyloric stenosis complicates the ulceration. Flatulence of mild degree, fullness and heart-burn occur in both types of ulcer, but are not characteristic.

A fractional test meal may aid, but will not establish a diagnosis. Hyperchlorhydria, like achlorhydria, may occur in healthy persons. Gastric ulcer, however, shows a tendency to association with a normal or only slightly increased total and free acidity, whereas ulcer on the duodenal side of the pylorus is usually marked by hyperchlorhydria.

Radiographical examination may show no evidence of ulceration in early stages of the disease. Sometimes deformity of the greater curvature from spasm of the circular muscle fibres occurs opposite an ulcer on the lesser curvature and is demonstrable by *x*-rays. Such spasm may occur, however, in the complete absence of ulceration. Chronic gastric ulcer on the lesser curvature may be revealed by protrusion of the bismuth into the crater of the ulcer. This appearance may be associated with evidence of hour-glass contraction. Duodenal ulcer is revealed by the fluoroscope when the stomach is small and hypertonic and empties itself of bismuth in an abnormally short time, which may be three hours or less, and when deformity of the duodenal "cap" is visible. When pyloric stenosis complicates the ulcer, a different *x*-ray picture is presented. There is gross delay in evacuation of the stomach, bismuth being still present at the end of eight hours, and the stomach is seen to be dilated. This appearance is also manifest when a more common cause of pyloric stenosis than ulcer, namely, malignant disease of the stomach, is present.

The early diagnosis of gastric cancer is of supreme importance if treatment is to be of any avail. Unfortunately patients sometimes present themselves when a mass is already palpable in the epigastrium or, worse still, the liver is grossly enlarged by secondary deposits. Such patients have been remarkably free from pain and vomiting and have had symptoms which they referred to mild anomalies of digestion. Even when they apply for medical advice early, the physician may fail to recognize the import of their condition. This is especially true of those in whom pain is mild or absent. Fortunately pain is an early symptom in the majority of instances. When a man of "cancer age," previously free of gastric symptoms, complains of pain coming on especially after his meals, the presumption that cancer is the cause should be raised in the medical attendant's mind. To wait for the appearance of anorexia, vomiting, loss of weight, anæmia and constant, intractable pain, is to wait too long. *X*-ray examination and gastric analysis should be carried out at once, and if these results added to the clinical findings are not definitely against the diagnosis of cancer, laparotomy should be performed.

Apart from loss of appetite, loss of weight and anæmia, which commonly exist with cancer in any portion of the stomach, the symptoms depend largely on the position of the growth. When it is situated near the cardiac orifice, dysphagia is the main symptom and *x*-ray examination may be necessary to decide whether the growth is in the stomach or the œsophagus. When present on the lesser curvature in the middle of the organ, pain, frequently severe, and vomiting of mild degree occur. When a mass is palpable, this is the usual location of the tumour. Associated hour-glass contraction of the stomach may be revealed by *x*-rays, but is very difficult to detect clinically. None of these appearances is constant, and when patients consult a medical man for the first time with lesions already well advanced, the tumour is usually in this position. The majority of malignant growths, however, take origin at or in the vicinity of the pylorus. In the early stages pyloric cancer is marked by delayed pain after meals, loss of appetite, loss of weight, and slight pallor, but as it grows the characteristic symptoms of pyloric stenosis appear. Vomiting becomes frequent and pronounced. Commonly the patient retains his breakfast and lunch, but after dinner vomits half-digested material composed of all three meals; or the vomitus on any day may contain food eaten on the previous day. Blood of "coffee grounds" appearance is frequently vomited under these conditions. Owing to the vascular nature of malignant growths, hæmatemesis accompanying symptoms of pyloric stenosis is evidence of carcinoma rather than of ulcer. Peptic ulcer in the active vascular stage seldom causes stenosis, this complication being usually reserved for cicatricial ulcers of long standing which have lost much of their vascularity. Pyloric cancer is not always marked by stenosis and dilatation of the stomach. Occasionally the invading cancer mass destroys the function of the pyloric sphincter without encroachment on the pyloric lumen. Food then passes straight through the pylorus after a meal, the stomach emptying itself with astonishing rapidity. Diffuse scirrhous cancer invading the submucous and muscular layers of the whole organ and marked by low malignancy and great connective tissue proliferation (linitis plastica, "leather bottle" stomach, "india-rubber bottle" stomach) is distinguished by the same hurry in evacuation. The stomach is converted into an inelastic, rigid, tubular organ of small calibre. The radiographic picture in this type is pathognomonic. Clinically, the patient complains of fullness after meals and inability to eat more than a few spoonfuls of food at one time. He is unable to vomit and hæmatemesis does not occur. It is seldom that any mass is palpable in the epigastrium.

Reflex Dyspepsia.

Diseases in other abdominal viscera are frequent causes of interference with gastric function. The symptoms are due to reflex pylorospasm, accompanied sometimes by hypersecretion. Thus a patient suffering from appendicitis may complain of symptoms which simulate closely those of gastric or duodenal ulcer. He may have fullness and flatulence, epigastric pain, occasionally "hunger pain," and vomiting. Much difficulty is experienced in making a diagnosis. When the symptoms occur at very irregular intervals, lacking the more or less constant periodicity of gastric ulcer, when they last for a short period (one or two days), have their onset at night, are made worse when the patient moves about, and when diet and alkali treatment give no relief, appendicitis is the probable cause. Sooner or later in one of the attacks definite tenderness is felt over McBurney's point, but the physician may sometimes make a diagnosis by palpation of the right iliac fossa *per rectum*.

Cholecystitis is similarly attended by symptoms of fullness, flatulence and epigastric pain. Vomiting may occur, but is not common. The painful "flatulent dyspepsia" of fat women is often due to gall stones. Again, the irregularity and brevity of the attacks should warn the physician that the stomach is not at fault. Tenderness on palpation over the tip of the ninth costal cartilage while the patient takes a deep inspiration, and radiation of the pain to the right scapular region make the diagnosis easy, but, unfortunately, the tenderness is occasionally limited to the epigastrium. We now have in Graham's test a valuable adjuvant to diagnosis in doubtful cases.

Functional Dyspepsia.

No branch of medicine is in a greater state of confusion than that which deals with so-called functional

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disorders of digestion. While classifications of these forms into anomalies of secretion and motility, into "sthenic" and "asthenic" compartments are of great interest physiologically, they are of little value to the physician who is unable and sometimes unwilling to persuade his patients to submit themselves to the skill of the radiographer and the biochemist. Moreover, when a patient has been proved to have achlorhydria or hyperchlorhydria, atonicity or hypertonicity, there is no certainty that his symptoms are caused by these defects. An ætiological classification works best in practice and has the advantage of being intelligible and convincing to the patient.

The great majority of functional disorders are due to mental and emotional causes and the majority of mistakes in diagnosis (and in treatment) are attributable to failure to recognize this fact. The mental causes include exhausting mental strain, excessive worry over business, domestic unhappiness and the like. Emotional factors are illustrated by the reactions to "shock," as when a sensitive individual is threatened with bankruptcy or with the death of one of his family. Many instances of nervous dyspepsia are really examples of anxiety neuroses. Many persons find mental conflicts unbearable, attempt to confront the problems of their existence for a time and then give up the struggle. Their mental anxiety is transformed into physical symptoms, unconsciously they transfer the battleground of their emotions from the mind to the body. We are all cognizant of the palpitation which is a physiological response to a sudden mental shock, and of the curious "sinking" sensation in the epigastrium which accompanies excessive worry. These normal reactions are seized upon as excuses for the discontinuance of the conflict, and the patient approaches his medical adviser complaining of heart trouble or indigestion. It is therefore necessary to interrogate the patient on worries which he is unwilling to revive, whenever there is any suspicion that he is suffering from dyspepsia of the non-organic kind. It is doubtless true that many of the symptoms depend on the type of secretory and motor functions which are peculiar to the individual. Thus the patient who has hyperchlorhydria, hitherto unconscious of this abnormality, now complains of fullness after his meals, sour eructations and heart-burn. The subject of achlorhydria or achylia gastrica suffers from a "heavy" sensation in the epigastrium, loss of appetite, flushing of the face after meals (as in acne rosacea) and much flatulence. Hypertonus frequently accompanies hyperchlorhydria and when it does, the amount of food taken at any meal is small, while the desire for frequent breaking of fast is strong. When excessive secretion coexists with normal tone, the appetite is increased. Atonia and achlorhydria are marked by a feeling of weight in the epigastrium and much flatulence. The flatulence is, of course, due to aerophagy from reflex swallowing. The patient, interpreting his sensation of fullness as gaseous fermentation, attempts to eructate gas and as first only succeeds in gulping down air. Later he regurgitates the air he has swallowed, experiences satisfaction and relief, and promptly swallows more. Air swallowing is not limited, however, to the subjects of atonic and achlorhydric dyspepsia. Only a broad differentiation of symptoms conformable to the various physiological types of dyspepsia is possible.

While "dietetic indiscretions" are commonly blamed for the onset of functional dyspepsia, it is probably seldom that this is true. It is difficult to understand why a young man, who has eaten all foods with ease for several years, should suddenly fail to digest a meal of pork, unless, of course, the food is infected and sets up a true gastritis. Nervous factors again predominate even in these instances. It is possible, however, that habit and incorrect dietetic training may operate in the causation of symptoms of indigestion. We can hardly wonder that a girl, warned through life by her mother that certain foods are indigestible, should promptly vomit whenever she disobeys her mother's injunction.

The diagnosis of functional dyspepsia is not difficult when the patient's former gastric history, symptoms, and mental worries are investigated. The one characteristic feature is the absence of pain. Patients, however, sometimes describe as pain symptoms which after interrogation prove to be "sinking sensations," fullness and so on. Sometimes the coexistence of "functional pains" elsewhere, "lifting" and "crushing" sensations in the head, and vasomotor disturbances, such as dizziness and flushings, suggest by analogy the real nature of the "indigestion."

Diseases Simulating Dyspepsia.

Reference has already been made to the frequent occurrence in extragastric affections of symptoms which patients commonly ascribe to some disorder of the stomach. When the physician falls into this error, the cause usually lies in too early attempts to make a diagnosis, failure to make a full physical examination, or imperfect appreciation of the significance of symptoms. There is a tendency to allocate symptoms to special organs without reference to the possible existence of a disturbance of integration of the bodily functions. Many diseases which may simulate dyspepsia are marked by irritability of the vomiting centre. These include the common acute infections in their early stages, chronic infections like pulmonary tuberculosis, pregnancy, the "uræmic state" in acute and chronic nephritis, diabetic and other forms of acidosis, the primary anæmias, conditions associated with secondary anæmia and malnutrition, angina pectoris and coronary thrombosis, the gastric crises of tabes dorsalis, cerebral tumour and migraine. It is seldom that complete investigation leaves the differentiation of dyspepsia from these conditions in doubt. The more frequent difficulty is to decide what extragastric disease is responsible for the vomiting.

Pain is a less common cause of confusion. Epigastric pain may occur in diaphragmatic pleurisy and basal pneumonia, in spinal caries, spinal neoplasm, tabes dorsalis and herpes zoster. The special character of the pain and the associated symptoms and signs facilitate the diagnosis.

Reviews.

HEALTH AT THE GATEWAY: PROBLEMS AND INTERNATIONAL OBLIGATIONS OF A SEAPORT CITY.—By E. W. Hope, O.B.E., M.D., D.Sc. Cambridge: At the University Press. (London.) 1931. Pp. xiv plus 213. Illustrated. Price, 15s. net.

The Gateway is the city and port of Liverpool. Those interested in the history of public health (and others) know that modern organised sanitary administration had its origin in England about 100 years ago. Two factors more than any others led to the consummation of public health policy in England; firstly, the rapid urbanisation of the country consequent on the industrial revolution, and, secondly, its extensive maritime and overseas trade. From the one, thanks mainly to the genius and foresight of Chadwick and Simon, developed the system of responsible local sanitary authorities guided by a central health board or ministry; from the other the English system of quarantine has been evolved, probably the sanest and most logical method of dealing with disease brought from overseas. These are familiar facts. There is, however, another method by which public health policy and legislation have materially progressed in England. Cities, in particular, may apply to parliament for special powers with regard to their own particular needs—water supplies, housing, etc.; at other times the powers asked for may be of a more general nature and such legislation may be of an experimental nature. If successful it may be applied later by parliament to the country

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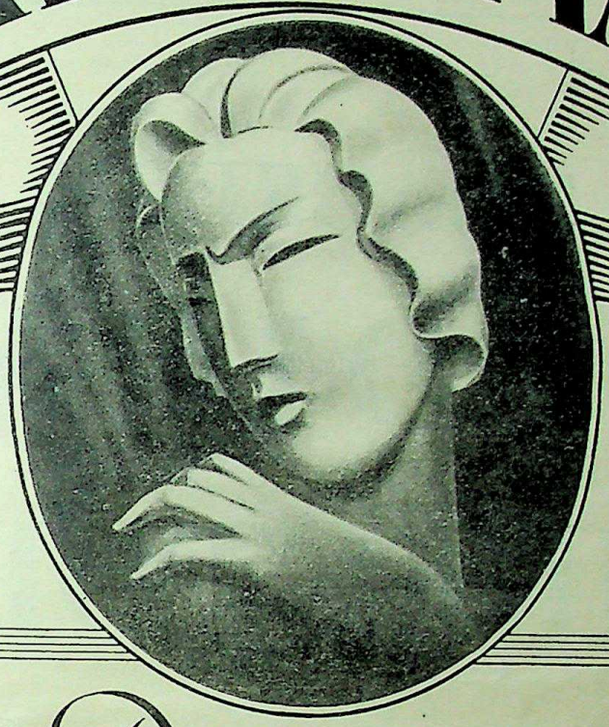

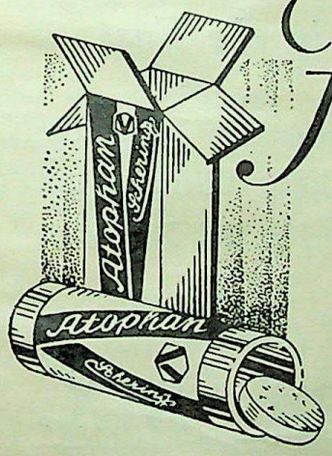

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in general. This factor has perhaps not been sufficiently appreciated. As a quickly-growing city situated in close proximity to the industrial counties of England, as a port with a large import and export overseas trade, as the chief centre of immigration and emigration, Liverpool admirably illustrates these three main lines of public health development and experimentation. With Liverpool as his text and theme Dr. Hope has written an extremely interesting and instructive book which every health officer should read. Its outlook, however, is not merely parochial and Dr. Hope's interests have been by no means confined to Liverpool affairs. His comments, criticisms and opinions on general public health policy are both shrewd and helpful. In the opening chapter on port administration, the author traces the progress of ideas and official action from 1664, "when the King in Council prescribed general quarantine regulations by which vessels coming from infected ports should not be permitted to come within prescribed distances of English ports, where lazarettes were appointed into which such ships must discharge their cargoes to be aired for 40 days", up to the agreements and rules of the International Sanitary Convention of 1926, under which the condition of the ship on arrival is the main guide for action by port sanitary authorities. The 1664 measures failed utterly, as might have been predicted now with our present knowledge, to stay the entrance of plague. In 1831 similar regulations failed to prevent cholera getting into England. In 1874 the important step was taken of making the Council of Liverpool the port sanitary authority, and so making it responsible in every way for guarding the port and city against infectious disease. This principle has been adhered to ever since in British ports and differs essentially from systems in vogue in most other countries where quarantine control lies with the Central Government. In India, under the Government of India Act of 1919, quarantine is a reserved central subject, but so far the Government of India has left the responsibility of executive action in the major ports to local government. In this chapter Dr. Hope gives some interesting details of the difficulties encountered with cholera, plague, and typhus introduced into the port. The old quarantine acts were finally repealed in 1896, and "a mere irrational derangement of commerce" and "paper plausibilities" were replaced by a sound defence based on scientific knowledge and not on fear, one calculated to assist rather than interfere with the trade and prosperity of the port. This chapter will be read with pleasure by those interested in international quarantine.

The description of Liverpool in 1700 onwards gives a vivid picture of the conditions under which our forefathers lived even up to within the last 60 years. Thousands lived in dark cellars, in crowded and congested courts and alleys, there were no sewers, water was hawked in the streets at a penny a bucketful, alcoholism was widespread, and its consequent poverty degradation and squalor led to starvation and beggary. Even up to 1883 it proved a serious obstacle to the progress of sanitation and not until 1900 was there any evidence that intemperance was diminishing in Liverpool. How these and other conditions were dealt with, gradually but persistently, by the city authorities is described with illustrative detail and comment in successive chapters. In 1847 Dr. Duncan was appointed the first medical officer of health of Liverpool, and to him and to his successors and to the various health committees appointed from time to time is due the steady improvement that has resulted in Liverpool ranking high in its health and sanitary administration. The infant mortality has dropped from 202 in 1897 to 92 in 1929 and the trend is still downwards. Housing conditions, water supply, hospital accommodation, sewerage, medical inspection of school children, maternity and child welfare form the main chapters.

Particularly interesting are the sections on housing conditions and improvement and on town planning—a tremendous amount has been accomplished despite difficulties and opposition. Dr. Hope is very definite in his opinion of the benefits of isolation hospitals in dealing with infectious disease.

We advise every one interested in public health history and administration to read Dr. Hope's book. The illustrations are effective and good.

A. D. S.

DISEASES OF THE TONGUE.—By W. G. Spencer, M.S., F.R.C.S., and S. Cade, F.R.C.S. (Being the third edition of Butlin's "Diseases of the Tongue"). London: H. K. Lewis and Co., Ltd., 1931. Pp. xvi plus 561, with 20 coloured plates and 123 illustrations in the text. Price, 35s. net.

THE first edition of Butlin's "Diseases of the Tongue" was published in 1885 and the second (1900), in which Mr. Spencer collaborated, did not differ in essentials from the first, the surgical technique for the removal of growths of the tongue having become standardised by that time, though on different lines in Germany and England, respectively. This phase is referred to in the present edition as "The earlier surgery of the tongue" and may be considered to have reached its acme in the figures brought forward by Butlin in 1909 in a discussion at the Royal Society of Medicine, in which he was able to quote 200 of his cases with 55 surviving more than three years. The advent of radium has changed the position in diseases of the tongue more than in any other branch of surgery and the authors had a difficult problem to decide whether to write a new book or to attempt to revive one nearly half a century old. Those who can remember the personality of Sir Henry Butlin, his clinical teaching and skilful operating and the scholarship which characterised the old book will welcome the decision they arrived at, namely, that there could be no better foundation for a new edition. The skeleton of the book remains the same, but the substance has been altered to bring it more into focus with modern conceptions of disease. The earlier chapters remain much as before, the importance of oral hygiene and oral sepsis are now better understood and guarded against, syphilis is now so well controlled that late and advanced lesions are rarely seen, oral tuberculosis has become a rarity and for these conditions improved methods of general treatment and diathermy have replaced excision. In its descriptions and illustrations of rare and unusual conditions this book is still, as formerly, a mine of exact and exhaustive information. Concerning the ætiology of cancer we are little wiser than we were in Butlin's days and for leucoplakia and benign ulcers his methods of excision remain still the best. But when we reach the treatment of carcinoma the book has had to be entirely rewritten. Excisional methods have been relegated to a chapter headed "The earlier surgery of the tongue", with its best results as cited above, and there follows a series of beautifully illustrated chapters on the modern technique of radium treatment. Mr. Cade is emphatic in his recommendation to extract all the teeth and allow the wounds to heal before proceeding to irradiation, and the superiority of the results of radium treatment over radon is brought out by some striking figures of recurrences. Precise details of the methods of needling for different situations are given together with directions for operations of access in the case of the deeper growths, and there is a well-illustrated section on the histological changes produced by irradiation. Diathermy excisions and the indications for this method of treatment receive a special chapter, as also the treatment of glandular involvement and the indications for block dissection and for open needling. The results of the treatment of 253 cases of oral carcinoma by radium are given in tabular form. In 126 of 169 cases of lingual carcinoma the primary growth was made to disappear, but it is too early yet to arrive at any final conclusions as to the ultimate results; still the fact that 48.8 per cent. of cases showed no sign of recurrence within two years is a good augury for the future. Very full bibliographies are appended to each chapter, and, as in the former

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editions the paper, printing and illustrations, especially the numerous coloured plates, are a credit to the publishers. The book has been in former days a classic of surgical literature and we wish it the success it deserves in its new dress. It is not of course a book for junior students, but every surgeon should add it to his library.

W. L. H.

PROCTOSCOPIC EXAMINATION AND THE TREATMENT OF HÆMORRHOIDS AND ANAL PRURITUS.—By Louis A. Buie, B.A., M.D., F.A.C.S. Philadelphia and London: W. B. Saunders Company, 1931. Pp. 178, with 72 illustrations. Price, 16s. net.

IN this little book, which chiefly deals with the diagnosis and treatment of hæmorrhoids, the author stresses the fact that a very thorough examination of the anus, rectum, and sigmoid is necessary before the diagnosis and especially the treatment of hæmorrhoids is undertaken.

Too many medical men, he says, from a sense of false modesty either in themselves or their patients, do not examine the patient at all before prescribing palliative treatment for hæmorrhoids, and many others are content with mere inspection. He further states that many of the latter on seeing a bulging at the anus, or feeling a pile at the ano-rectal margin, diagnose hæmorrhoids, and cheerfully operate without further inquiry as to the cause of the piles, and thus often miss a much more serious condition.

Mr. Buie finishes his exhortation with the remark. "As for myself, I would willingly insert my finger into the rectum of a patient, professionally, with whom I should be reluctant to shake hands, socially".

Many of the accepted theories of the causation of piles are not acceptable to the author of this book, who states that, in his opinion, infection is responsible for all cases of piles.

His statistics of 1,000 carefully-studied cases are interesting. Of this series of 1,000 cases, 533 were males, and 467 females, in each sex the greatest number occurring between the ages of 40 and 50. Of the male cases most occurred amongst the workers. Two hundred and eighty-three were farm labourers, and of the remaining 250 by far the greatest number came from mechanics, salesmen, clerks, and other workers. Very few led a sedentary life. Amongst women pregnancy was responsible for the greatest number of cases.

The author prefers operation, preferably under sacral-block anæsthesia, to injecting sclerosing fluids, as in his opinion the latter have many disadvantages, and he believes operation results in a more lasting cure.

It is a good, serviceable book, containing many admirable diagrams and micro-photographs.

H. E. M.

DETACHMENT OF THE RETINA. A CONTRIBUTION TO THE STUDY OF ITS CAUSATION AND TREATMENT.—By J. Ringland Anderson, M.C., M.B., B.S. (Melb.), F.R.C.S. (Edin.), F.C.S.A., D.O.M.S. (Lond.). Cambridge: At the University Press, 1931. Pp. xiv plus 207. Illustrated. Price, 20s. net.

THIS excellent publication of 202 pages on detachment of the retina by Dr. Anderson contains all the facts and theories of our present-day knowledge of the subject. The author has studied the literature in divers languages, has recorded in a simple, concise way the views of various authorities and has provided an exhaustive bibliography for those in busy practice.

Hitherto the pathogenesis of simple detachment of the retina has been to all intents and purposes unknown and, although much has been elucidated in recent years by the advances in bio-chemistry and bio-physics, much research is still necessary before full knowledge of its causation is known.

Meanwhile largely on account of the work of Gonin and Vogt, a mode of treatment, which is in its origin almost entirely empirical but which is successful in approximately fifty per cent. of cases, has been discovered. The monograph contains a foreword by Sir John Parsons, special chapters are written on the ætiology, the structure and function of involved tissues, the pathogenesis, the differential diagnosis, the treatment, and the prognosis, and finally there is an appendix. The causation of retinal detachment is discussed under four headings:—The theories of distension, depression, attraction and exudation. From these it may be concluded that in nearly all detachments of the retina, which have an abrupt onset and are seen early, there is a hole or tear in the retina. The aperture is usually due to retinal degeneration but the actual detachment is precipitated by some slight trauma. The tear or hole is usually situated in the periphery of the retina, because there the retina is thinnest and is less re-inforced by the nerve fibre layer. Spontaneous detachments of the retina apart from those due to trauma and certain diseases are secondary to some form of uveal disease. This uveitis may lead directly to effusion and consequently a detachment of the vitreous, retina or ciliary body. When to these is added a slight trauma or vascular disturbance then a detachment may take place by means of a retinal tear or a choroidal effusion. Uveal disease is due to some morbid general phenomenon and, until this is solved, the pathogenesis of retinal detachment must still remain obscure.

Gonin's operation of ignipuncture, which entirely depends for its success on the accurate localisation of the retinal tear, is now the established one for the cure of retinal detachment and consists of cauterisation of the tear or hole and thereby closing up the aperture in the retina.

Surprisingly good results have been obtained by this operation even in some cases of long-standing detachments and without Gonin's idea these cases would have been as good as lost.

The monograph is well written, in simple, clear language; it contains a number of excellent illustrations; and it provides most interesting reading. We strongly recommend it, and regard it as a book which should have a place in the library of every ophthalmic surgeon working in India.

E. O'G. K.

CANCER.—Edited by F. E. Adair, M.D., F.A.C.S. Philadelphia and London: J. B. Lippincott Company, 1931. Pp. xix plus 484, with 168 illustrations. Price, Rs. 33-12. [Obtainable from Butterworth & Co. (India), Ltd., Calcutta.]

THIS volume is dedicated to Dr. James Ewing in honour of the great work he has done in pathology, particularly on the subject of neoplasms. The work is divided into four parts, cancer in its general relations, cancer research, regional cancer, and radium and Röntgen-ray therapy. There are 54 papers in all, mainly contributed by the leading authorities in America, England and other parts of the world. The volume, therefore, becomes a very important memoir to those who are interested in the study of cancer, as it deals with it in every aspect of the subject. One would like to review the whole of these papers, but the space forbids us from doing so. Though the reviewer hesitates to omit mention of papers by such authorities as Sir Lenthal Cheatle, William Mayo, W. Cramer, G. Crile and Lazarus Barlow, who have contributed towards this volume, as there is much to learn from these papers, yet he feels compelled to select certain papers that he knows will appeal to the readers of the journal. The papers by Sampson Handley on the rôle of lymph stasis in the genesis of cancer is very suggestive, when we see that a fibroblastic obstruction of the lymphatics plays an important part in the production of both innocent and malignant growths. His work on the formation of simple papilloma of the skin, as well as the papillomatous growths of soft and pigmented moles, shows definitely that the hypertrophy is due to lymphatic obstruction. He shows that in epithelioma supervening on lupus the lymphatic obstruction first causes a verrucose condition, which in the process of

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Extract from the Medical Journal of Australia, October 4, 1930.

(The Official Journal of the B.M.A. in Australia.)

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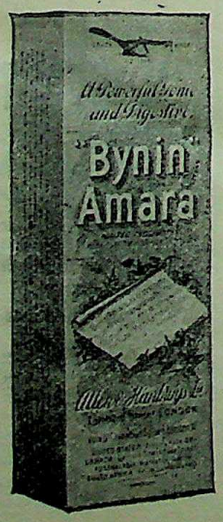

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time may develop into a cancer. We, therefore, see that in the initial stages lymphatic obstruction can be brought about by irritants in various ways and even by emboli, which gave rise to an increased lymph supply and hypertrophy of the cells. The factor that determines whether the growth will be restricted (innocent) or invade the tissues (malignant) is a growth-inhibiting factor which may be present or absent. This work of Sampson Handley is a very important advance in explaining the origin of cancer.

Dr. W. Coley quotes some extremely interesting cases of multiple myeloma which have been cured by injections of the bacterial emulsion named after him. This is a vaccine consisting of *Streptococcus pyogenes* obtained from cases of erysipelas and of *B. prodigiosus*. The extremely difficult group of neoplasms which consists of Hodgkin's disease, lymphoblastoma, both leukæmic and aleukæmic, and mycosis fungoides, is discussed very ably by Dr. Warthin. He shows how these cases merge one into another. This is followed by an equally good paper on Hodgkin's disease by Dr. Elise S. L'Esperance. Dr. D. Lewis discusses a condition which he calls elephantiasis nervosum, the name, however, is not a very appropriate one, as these cases are fibromata occurring along the course of the great nerves of the body, and should be classified with the Von Recklinghausen's syndrome. Von Recklinghausen defines this syndrome as consisting of (1) pigmented areas of the skin situated about the scapula or sacrum, (2) multiple fibromata and (3) neurofibromata, any two of which are sufficient to diagnose the syndrome. The reviewer is of the opinion that a fourth type of fibromatosis should have been added, namely, the condition known as dermatolysis. This is a diffuse fibromatosis along the course of the peripheral nerves supplying the skin and subcutaneous tissue. These neurofibromata growing along the course of the great nerves show a great tendency to form sarcomata.

An interesting paper by Dr. Max Cutler on trans-illumination of the breast may give important help in the clinical diagnosis of neoplasms in this region if the size and shape of the breast is favourable for trans-illumination. The pathologist will welcome the paper by Dr. Bloodgood, discussing the border-line cases of breast tumours. Every one who has had experience of this work knows how extremely difficult it is to state definitely in those cases when a fibro-adenoma is passing from an innocent stage to that of pre-malignancy or malignancy. These breast tumours illustrate very accurately Mr. Sampson Handley's view on the origin of these neoplasms as signs of inflammation are seen in almost every case. One sees these signs of irritation and lymph obstruction, and the greater the irritation, the greater is the danger of malignancy. Dr. Bloodgood also clearly shows the necessity of examining these tumours thoroughly, making sections from several areas, because very frequently one finds the main mass of the tumour to be undoubtedly innocent, with perhaps only one area passing into a pre-malignant state.

There is a paper by Drs. Adair and Bagg on the experimental and clinical study of the effects of dichlorethysulphide (mustard gas) on mouse cancer, and on the application of these results experimentally on human beings for the treatment of squamous-celled carcinoma of the skin. They show that it is possible for mustard gas to bring about a cure, but at present one cannot be certain whether the cure will be a permanent one. The action of this gas causes an intense prolonged dilatation of the vessels which continues for 2 to 5 days after its application, causing at first an intense œdema which in time results in necrosis. After a period of time, tissue equilibrium is re-established and repair commences. The blood vessels are seen to be collapsed and extensively damaged. It is probably the diminution in the blood supply to the tumour that causes cicatrization which leads to a cure. Injections into the tumour have to be given with the greatest care and judgment owing to the intense inflammatory reaction and the subsequent extensive necrosis of the surrounding tissue. The method will be of value in dealing with the skin, and other cancers that are localised and superficial.

The whole volume is a wonderful contribution in honour of the work of Dr. James Ewing, and should be in the possession of every medical library and those interested in the subject.

H. W. A.

MINOR SURGERY.—By L. R. Fifield, F.R.C.S. (Eng.). Second Edition. Revised by R. J. McNeill Love, M.S. (Lond.), F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1931. Pp. viii plus 439, with 281 illustrations. Price, 12s. 6d. net.

MR. FIFIELD was just about to start work on the second edition of his book, Minor Surgery, when his untimely death cut short his proposed labours. The revision and preparation of this edition was therefore undertaken by Mr. R. J. McNeill Love whose own book, A Shorter Surgery, is well known.

Minor Surgery is however very different from Mr. Love's own book in that it is definitely confined to minor surgery, and no mention is made of any condition which does not come within the scope of the general practitioner; this is exemplified by the fact that there are no sections dealing with chest or abdominal surgery.

There is a chapter on minor surgical operations in which the radical cure of inguinal hernia is described, but otherwise this chapter is devoted to minor operations, such as excision of varicose veins, ingrowing toe nail, circumcision, etc., and no amputations other than those of fingers and toes are discussed.

The importance of infections of the hand is brought prominently before the reader's mind, a considerable amount of space being taken up with a concise description of the anatomy of the tendon sheaths and the compartments of the palm, and the proper incisions for the evacuation of pus are adequately shown. A quarter of the volume is devoted to fractures, and there are two useful chapters on bandaging and anæsthetics.

The book is intended for students and practitioners both of whom certainly will obtain from it much useful information; students, however, must read it in conjunction with, and not instead of, their surgical textbooks.

H. E. M.

Annual Reports.

ANNUAL CLINICAL REPORT OF THE GOVERNMENT HOSPITAL FOR WOMEN AND CHILDREN, EGMORE, MADRAS, FOR THE YEAR 1929. BY C. A. F. HINGSTON, C.I.E., O.B.E., LIEUT.-COL., I.M.S., SUPERINTENDENT, MADRAS. PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS, 1931. PRICE, RS. 6-10.

DURING the year under report 7,084 women and 661 children were admitted into the hospital for treatment and the following table gives the particulars regarding these admissions:—

	Admissions.	Deaths.
(1) Ante-natal cases ..	1,941	18
(2) Maternity cases (cases delivered in the hospital, or admitted within 24 hours after delivery at home) ..	2,894	70
(3) Post-maternity cases (delivered at home and admitted into hospital 24 hours after delivery) ..	195	22
(4) Children's section ..	661	100
(5) Gynæcological cases ..	1,057	24
(6) General diseases treated ..	997	45
TOTAL ..	7,745	279

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MATERNITY CASES.

There were 2,894 deliveries during the year under report, of which 250 were abortions. The nature of the labour, and the result to mother and child are given in the following table:—

There were 106 cases of preternatural labour with two deaths; of these, 76 were cases of breech presentation, 24 of transverse presentation, and 6 of compound presentation.

There were 483 cases of complex labour, that is,

TOTAL LABOUR CASES.

	Mothers.				Children.							
	Alive.		Died.		Macerated.		Still-born.		Died.		Alive.	
	P.	M.	P.	M.	P.	M.	P.	M.	P.	M.	P.	M.
Natural labour ..	384	1,425	..	1	..	..	5	14	21	19	358	1,393
Tedious labour ..	35	36	..	..	..	..	2	1	2	..	31	35
Laborious labour	80	86	5	3	..	..	11	10	7	3	67	76
Preternatural labour.	25	79	..	2	..	10	6	21	4	6	15	44
Complex labour	123	310	14	36	10	37	24	73	28	62	78	198
Total ..	647	1,936	19	42	10	47	48	119	62	90	549	1,746
	2,644											
Abortions ..	50	191	1	8	..	..	..	..	..	..	..	..
Grand Total ..	697	2,127	20	50	10	47	48	119	62	90	549	1,746
	2,894				2,671							

Out of the total number of deliveries, 1,810 women were delivered naturally with one death. Although in this case delivery was natural and before examination, it is very doubtful whether the patient was not examined outside. The cause of this death was puerperal septicæmia, but no vaginal examination was made in the hospital. In view of the fact that in several of the cases admitted in this hospital, the information that the patient had been subject to a vaginal examination outside was obtained only with difficulty, it cannot be presumed that the death in this particular case was due to autogenous infection.

Out of the 1,809 cases of natural labour, 384 were primipara and 1,425 were multipara. There were 19 children born still, 5 of primipara, and 14 of multipara. Seventy-one cases of labour were tedious, that is, although the labour ended without any artificial assistance, it lasted for more than 24 hours. There were 3 still-births in this group. The causes of still-births are given below:—

Cause of still-births—

Maternal malaria	2
Do. anæmia	1
Do. œdema	1
Do. albuminuria	2
Antepartum hæmorrhage	1
Labour, immature	3
Do. premature	2
Do. prolonged	2
Cause not traceable	4
Delivered at home	1
TOTAL ..	19

There were 174 cases of laborious labour, and in 149 of these delivery was effected by the application of forceps. Internal podalic version was done in 5 cases, Cæsarean in 14, symphysiotomy in 1 case, craniotomy in 4 and cephalotripsy in 1.

labours complicated by some abnormality in the mother due to pregnancy or associated with pregnancy.

There were 25 cases of twins and 1 of triplets, of which three were complicated with accidental hæmorrhage and two with eclampsia. In many of these cases, delivery was premature, with the result that 23 of the premature children delivered died in hospital, including three triplets.

Classified according to weight, the number of cases were as follows:—

Weight.	Number of children.
Below 2 lb.	5
From 2 lb. to under 3 lb. ..	17
Do. 3 lb. do. 3½ lb. ..	7
Do. 3½ lb. do. 4½ lb. ..	16
Do. 4½ lb. do. 5 lb. ..	7
Do. 5 lb. do. 6 lb. ..	1
TOTAL ..	53

Puerperal eclampsia.

There were 54 cases of eclampsia admitted for treatment in the year under report of whom eight died, giving a mortality of 15.81 per cent. The mortality rate is slightly in excess this year. There were 36 cases of primipara and 18 of multipara.

The treatment adopted was similar to what has been carried on in this hospital for some years now, and in the present stage of our knowledge of the ætiology of the disease, we feel that nothing radical has happened to change our method of treatment.

The main lines of treatment are to control the blood pressure to within reasonable limits by the administration of veratrone; morphia or omnopon for its immediate effect on the recurrence of fits, bowel washes as a means of relieving the intestinal toxæmia, iced enemata and other measures for controlling any tendency for hyperpyrexia which is not infrequent, particularly in this country, and general measures calculated

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Diet in debility

IT has been demonstrated that many cases of illness which manifests itself mainly as debility, associated with headache, constipation, nervousness, and in severe cases recurrent (cyclical) vomiting, are due to Ketosis. This is a condition which is primarily due to disturbance of the function of the liver as a consequence of which digestion and assimilation of fat are markedly retarded or even for the time abolished. If, however, sugar is added to the diet the disease is rapidly cured.

It is evident that when fat is administered to children it should not be in a form that gives rise to derangement of the function of the liver and heart muscle, and that it should be guarded by an adequate quantity of sugar.

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to prevent complications in the lungs and respiratory or cardiac failure. Emphasis is laid upon starvation and elimination, and in the large majority of cases, delivery is left to natural powers if possible, or aided in the second stage of labour by forceps, so as not to allow the stage to last for more than half an hour.

The table showing the distribution according to age and parity reveals the fact that while the disease is far more common in primipara, it has still occurred once in a 9-, 10- and 11-para, respectively, and that classified according to age, the oldest patient was 40 years of age. In the large majority of cases, the fits occurred during labour. In three cases they occurred during the course of pregnancy and one patient was admitted with post-partum eclampsia.

While the presence of albuminuria is frequent, it may be noted that at the time the patient is admitted the albuminuria need not be present and in nine cases, in this series, was not present, although at a later stage, either within 12 hours after the fits or in some instances 24 to 48 hours later, the presence of albuminuria was noted.

The maximum blood pressure ranged between 220 and 110 mm. of mercury except in one case where the woman was admitted with a blood pressure of 84, the urine was loaded, she was delivered with forceps and died in a condition of collapse. It would appear that, while with a high blood pressure there is a tendency for repetition of fits, cases with such high blood pressure respond more readily to treatment than cases with a low blood pressure, and cases with a high degree of albuminuria are much less resistant to treatment than cases of a low degree of albuminuria.

Among the symptoms of pre-eclamptic toxæmia commonly found in these cases may be mentioned headache, vomiting, dimness of vision, restlessness and œdema or general anasarca. The effect of Veratrone is seen within 15 minutes after the injection in a prompt reduction of the blood pressure, and slowing of the pulse. It would appear that large doses of Veratrone are not needed for the lowering of blood pressure, and at present in cases where the blood pressure ranges above 160, 0.5 c.cm. of Veratrone is given, while in cases ranging between 130 and 160, 0.25 c.cm. of Veratrone is first tried. Far from having any antagonising effect, the combination of Veratrone and morphia—which has been so frequently given in many cases—helps to reduce the blood pressure, controls the fits and quietens the patient to a remarkable degree. In some cases, particularly if large doses of Veratrone—doses of 1 c.cm.—are given, the fall in blood pressure is so rapid that it produces a certain amount of collapse associated with severe vomiting. With stimulants, saline and glucose *per rectum*, the patients generally rally, but the effect upon the fœtal heart is occasionally adverse.

Hyperpyrexia continues to be a troublesome complication in cases of eclampsia and should be controlled as early as possible. It would appear that the condition of hyperpyrexia favours congestion of the lungs, tends to promote weakness of the heart and gives rise to cerebral complications. Postural treatment, careful nursing so as to prevent the mucus gravitating into the upper air passages, reduction of temperature, and use of adrenalin and atropine in cases where there is a tendency for congestion of the lungs are the methods usually adopted to prevent complications. The delivery is, in the large majority of cases where the conditions are satisfactory, left to natural powers, except that, in those cases where the conditions are satisfactory, the second stage of labour is not allowed to last long.

The large incidence of still-births is probably due to four causes:—(1) pre-maturity, (2) hyperpyrexia and high blood pressure, (3) the effect of morphia under certain circumstances, and (4) the severity of the eclamptic toxæmia itself.

Ante-partum hæmorrhage.

There were 48 cases of ante-partum hæmorrhage—30 due to placenta prævia and 18 to accidental hæmorrhage. It may be stated at once that the large majority of these cases are brought into hospital after severe bleeding outside and very often in a condition of collapse. In some cases they have been badly handled outside by barber midwives, with the inevitable consequence, that septic infection of a severe degree results.

Among the 30 cases of placenta prævia treated during the year, five were primipara, and 25 were multipara. Eight of these were cases of complete placenta prævia, and 22 of the incomplete variety. The terms complete placenta prævia and incomplete placenta prævia seem to convey a clearer conception of the condition than the terms central, marginal and lateral, as in a large majority of cases, the marginal and lateral varieties are indistinguishable when the woman comes late in labour. The method of delivery adopted in 29 cases which were delivered was Cæsarean section in two cases, internal podalic version and extraction in four, extraction of the breech in five, external version in four, the application of forceps in seven, while in seven other cases delivery was by natural powers. While Cæsarean section is undoubtedly a method of treatment to be adopted in the interests of both mother and child, it does not appear to be a feasible mode of operation with the large majority of patients who come at a stage and in a condition where this method of treatment is impossible of application or will not produce any better results. The treatment for collapse in cases of placenta prævia is always emphasised, as even in those cases where at the time of the delivery the condition of the patient may not suggest a state of collapse, very often collapse intervenes soon after, it would seem admissible to start the submammary saline before any attempt at delivery is made and to continue the saline after the delivery in case this is also found necessary. Any method of forcible delivery by operation should be condemned, particularly in these cases, as the condition of the cervix is so very soft and easily lacerable that risks of tear and septic infection are very great indeed. Two of the patients died among the 29 delivered and in one case the woman came in a condition of collapse and died undelivered, within three hours of admission.

Out of the 18 cases of accidental hæmorrhage, two were of the concealed variety, six were of the revealed variety, and the rest of the combined variety, that is, partially concealed and partially revealed. This variety is far commoner than is commonly supposed. The condition of the uterus is such that although it allows a certain amount of internal bleeding to take place at one stage, later the uterus begins to act and part of the blood is expelled and when delivery is completed, besides the external bleeding that has been noted, large dark blood clots are expelled showing that a certain amount of concealed hæmorrhage had taken place previously. It seems that this variety is much the commonest of the three varieties and pure cases of concealed accidental hæmorrhage are by far the rarest. In both cases of concealed accidental hæmorrhage albuminuria and signs of toxæmia were present.

It may be stated that in cases of revealed accidental hæmorrhage, and in many of the cases of combined accidental hæmorrhage, the treatment adopted is simple—either plugging of the vagina or rupturing the membranes, or small doses of injected pituitrin, or, where conditions are satisfactory, immediate delivery is all that is indicated. The treatment of collapse and the prevention of collapse are the two things necessary to combat complications. The result to the child is, of course, disastrous in most of these cases. The pre-maturity, the severity of the bleeding and the fact that in a large majority of cases patients come at a fairly late stage when the fœtal heart is inaudible account for the large incidence of still-births among these cases.

Rupture of uterus.

Nine cases of rupture of uterus were admitted during the year and all the cases were admitted in a condition of collapse after the rupture had taken place outside. Only one case recovered. Two of the cases died undelivered, having been admitted in a moribund condition and having died within a few minutes afterwards.

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The usual cause of rupture is either a malpresentation, as a brow, or contracted pelvis.

The condition of the cases on admission precludes the possibility of operative treatment, and in cases where such operative treatment has been undertaken, the results have been so unsatisfactory that we are now compelled to adopt only conservative methods of treatment for such cases. It may be mentioned that the large majority of cases are brought in from outside the Corporation limits and have had to come along rough roads in springless carts for hours before they are admitted. Conditions in the rural parts being what they are, it is inevitable that these cases should come in at such a late stage for treatment in this hospital.

Retained placenta and post-partum hæmorrhage.

There were 19 cases of post-partum hæmorrhage, in eight of which the placenta had to be manually removed. Two cases of manual removal of placenta died; and of the post-partum hæmorrhage cases uncomplicated with retained placenta, two died, one of which was delivered by natural powers, the other after application of forceps.

Hydramnios.

Ten cases of hydramnios were admitted in the year, in nine of which the delivery was effected by natural powers, and in one, internal podalic version was performed. Six children were born alive, and four were still-born. The usual method of treatment is rupture of the membranes high up and it has been found that this can be done most effectively by means of a male catheter being passed by the side of the membranes, between the uterine wall and the membranes, and carried up fairly high, and then inserted into the amniotic cavity. The flow of the fluid is well-regulated through the lumen of the catheter and after a fair quantity has thus been expelled the catheter can be easily removed, the advantage being that the bag of membranes continues and that a ball-valve opening is established which gradually allows the fluid to drain away. The usual precaution for the treatment of possible post-partum hæmorrhage should always be taken.

Prolapse of the cord.

There were 21 cases of prolapse of the cord admitted during the year, in ten of which the cord was prolapsed and pulseless at the time of admission to hospital. Ten children were born alive and 11 still-born. The complication occurred in 11 cases of vertex presentation, 7 cases of transverse presentation, 2 cases of breech presentation, and 1 compound presentation. In 4 cases, delivery was effected by forceps, 2 children being born alive. Version and extraction was done in 8 cases, in 7 of which the children were born alive. Two cases of breech were extracted with one still-birth and one child alive.

Anæmia.

There were 41 cases of anæmia complicating pregnancy. The usual causes of the anæmia were ancylostomiasis and other helminthic infections, malaria, and pernicious type of anæmia. A survey of the anæmias of pregnancy is being undertaken, and it is hoped to report at greater length on this subject in the next annual report.

A very large number of complications occurring in pregnancy are due to tropical diseases—dysentery, enteric, malaria, small-pox, filariasis, infective granuloma, being some of the tropical diseases associated with pregnancy that were treated in the year under review. These complications undoubtedly increase the morbidity and mortality of maternity institutions in the tropics—the more so because unfortunately for want of sufficient ante-natal care, the patients do not resort to hospital treatment, or to private consultations with family physicians at a sufficiently early stage. It is hoped with the more extensive and intensive work with ante-natal clinics, there will be a perceptible improvement in the incidence and the result of treatment for these complications.

Deliveries are classified as abortions when the duration of pregnancy is calculated to be less than 28 weeks or the weight of the fœtus less than 2 pounds. There were 250 cases of abortions:—

Details of these are given in the following table:—

Abortions, arranged according to complications.

Complication.	Mothers.			
	Alive.		Died.	
	Primipara.	Multipara.	Primipara.	Multipara.
Vesicular mole ..	2	7	..	1
Carneous mole ..	1	1	..	..
Twins ..	..	4	..	..
Concealed accidental hæmorrhage.	..	1	..	..
Placenta prævia	1	3	..	..
Post-partum hæmorrhage.	..	1	..	..
Toxæmia of pregnancy.	..	1	..	..
Albuminuria ..	1	6	..	..
Erosion of cervix	1	8	..	1
Ante-version or flexion of uterus.	1	1	..	..
Retroversion of uterus.	5	18	..	..
Irregular bleeding	..	1	..	..
Anæmia ..	1	10	..	..
Dysentery ..	..	1	..	..
Malaria ..	1	8	..	1
Pneumonia ..	..	2	..	1
Syphilis ..	..	1	..	..
Tuberculosis ..	1	..	..	1
Bronchitis ..	..	4	..	..
Enteritis ..	..	1	..	..
Valvular disease, heart.	..	..	1	1
Injury ..	1	1	..	1
No appreciable complication.	34	111	..	1
Total ..	50	191	1	8

The morbidity rate is certainly much higher than it is in many other hospitals; but there have been a very large number of cases where the morbidity was due to non-puerperal causes. The standard morbidity rate adopted was a rise of temperature of 100°F. or over on any two occasions between the 2nd and 8th days of the puerperium. Out of a total 2,894 maternity cases, there were 328 morbid cases, giving a percentage of 11.33.

REPORT ON AN INVESTIGATION INTO MALARIA IN THE UNION OF SOUTH AFRICA, 1930-31. By PROFESSOR N. H. SWELLENGREBEL, FROM THE DEPARTMENT OF PUBLIC HEALTH, UNION OF SOUTH AFRICA.

PROFESSOR SWELLENGREBEL was invited by the Union of South Africa to investigate and report on conditions of malaria throughout the Union. This report is an account of his findings, observations and recommendations. As we would expect, the report is a clear presentation of scientific findings and opinions. Professor Swellengrebel has been a member of the various malaria commissions of the League of Nations and has been the author of various proposals and statements enunciated in such reports of the League. His reputation as a malariologist with a biological

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outlook lends an added value to his present report which will be read with considerable interest everywhere by those interested in malaria.

The malaria problems of the Union differ from those of other countries in local setting and in the anophelines concerned, but there are some similarities and analogies to those of India.

There appear to be only two carriers, *Anopheles costalis* and *Anopheles funestus*. *A. costalis* breeds in slightly muddy pools which for its successful propagation require to be continually replenished by fresh water. Such puddles must be exposed to sunlight, and should contain no vegetation at all. In these respects it would appear to be similar to *Anopheles rossi* of India. *Costalis* is thus dependent on local rains. It is, therefore, particularly associated with tracts of *epidemic malaria*. In such areas, epidemics of great intensity occur every few years; in the intervening years, the malaria present is almost negligible. In such non-epidemic intervals the *costalis* breeding places are to be found in pools in the river beds. Suitable rains, however, with showers recurring at intervals of less than 7 days will produce numerous road-side pools suitable for extensive *costalis* breeding. Observations of the amount, extent, and particularly the intervals between fresh showers of local rainfall will provide a means of forecasting epidemics of *costalis* malaria.

Funestus malaria on the other hand is of the endemic type always more or less present, and varying from year to year to a much less extent than *costalis* (epidemic) malaria. *Anopheles funestus* is a stream breeder, its larvæ being found in the grassy edges of the back-waters of quickly running hill streams and rivers. It is, therefore, independent of local rainfall, though dependent on such a distribution of rainfall as will keep the hill streams flowing.

A. costalis apparently resembles *A. maculatus* in its carrying propensities; a few breeding places of *costalis* inevitably produce malaria in the human population; *funestus* on the other hand may be apparently breeding freely with little adult production and consequently little malaria. The problem, however, is not simply one of mosquito distribution. The human factors differ immensely in different areas. In *estate malaria*, the fever in the native labour force is the problem; in *farm malaria* the problem wholly concerns the white population. The farms are widely scattered; each consists of a small white population living in contiguity with the native labour. The infection is strictly localised, but nevertheless severe. Farm malaria scares away settlers; estate malaria disorganises labour forces. Breeding places like tanks, tree holes, swamps, or "vleis" may be apparently neglected as they breed neither *funestus* nor *costalis*. *A. costalis*, as stated above, likes clear pools devoid of shade and vegetation; indiscriminate cutting of vegetation would, therefore, be definitely harmful in a *costalis* area, though in the case of *funestus* streams, it might be useful. Professor Swellengrebel, however, did not find vegetation harbouring adult anophelines.

In prevention, Professor Swellengrebel again and again reiterates his opinion, "*Malaria is here a local disease to be dealt with by local efforts.*"

He illustrates the differences in prevention achieved in the past by various classes of farmers. Both prophylactic quinine (5—10 grains daily) and screening of houses have, he states, done a great deal to keep malaria under in many of the endemic areas. He has no doubt whatever about the value of both of these measures, even if faultily carried out. In epidemic areas the constant yearly stimulus to preventive work is absent. Professor Swellengrebel would place great reliance on the continuance and extension of these methods, and the district surgeon should take a definite part in their propagation. The idea that intramuscular injections of quinine are the only means of treating malaria has apparently become widespread. This view is held by most medical men and by the public. Professor Swellengrebel is rather angry that this should be so.

The killing of adult mosquitoes in houses by hand and by oil sprays is strongly recommended as a third local household measure. For this one of the cheap imitations of "Flit" is recommended.

Anti-larval methods are not enthusiastically recommended, or rather the difficulty of carrying them out efficiently and successfully is clearly set forth. The specific habits of *costalis* and *funestus* make the problem easier however, and Professor Swellengrebel recommends an extension of the public health service by sanitary inspectors, in order to demonstrate the methods of anti-larval work, and the particular pools and streams that should be tackled—the farmer, however, must do the oiling himself and the problem is to get him sufficiently interested in his task.

The "sugar belt" in "estate" areas.—The malaria here is mostly of the epidemic type. It is particularly here that forecasting might be possible, the rainfall being carefully noted. (There are *funestus* areas of course on the estate lands as well as *costalis* areas.) Professor Swellengrebel recommends research in a field station for malaria control, and the development of a trained sanitary personnel, *i.e.*, instruction of district surgeons, health visitors and school teachers. He mentions another report in which his technical results are set forth. This we have not received; it should be of great interest to scientific workers. The present report is one intended more for general reading; as a clear and succinct presentation of a rapid investigation and of recommendations based on accurate observation, it is an excellent example. Intense local effort is its watchword—screening, prophylactic quinine and killing of adult anophelines, supplemented by *ad hoc* action against two particular anophelines by anti-larval methods carefully thought out, directed, and controlled.

Correspondence.

HABITUAL FORMATION OF STONE IN THE BLADDER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—With reference to Dr. Tambe's letter in the *Indian Medical Gazette* of September 1931 on habitual formation of stone in the bladder, wherein he asks for the views of workers in the field of urology; the following has been my experience.

I have seen occasionally cases, in which stones had been crushed by reputed litholapaxy surgeons, seeking readmission for the same trouble some months after. In these cases it is easy to lay the blame on the surgeon leaving small fragments behind which have formed the nucleus for the next stone; but I am sure most of these are cases of habitual stone formation, rather than instances where fragments have been left behind; the latter accident may occur with an inexperienced surgeon but very rarely with an experienced one. Moreover, such small fragments, even if left behind, are easily voided subsequently. In this connection, I give the case of a recent operation in this hospital. The patient, a boy of 12 years, was having a large and a very hard stone crushed. After two hours crushing and washing, there were still a few fragments left behind and it would have taken at most 15 minutes more to complete the operation, but the patient had been taking chloroform very badly and was giving much trouble. I had very reluctantly, at the instance of the anæsthetist, to stop the operation. Three days later I found both by sounding and the lithotrite that there was not a single fragment in the bladder. Even the evacuator aspirated no fragments and I am positive, and so was my assistant, that there were at least a dozen small fragments within the bladder when I stopped the operation.

I read in the *Lancet* details of a case published about 1926-28, similar to the one described by Dr. Tambe. Unfortunately, I am not able to find the cutting which I had kept amongst my papers. A suprapubic operation

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in an adult was done three times at intervals of some months to a year, each time for removing a stone. After the third operation the surgeon decided to put his case on saccharine tablets and he stated that after this the stone never formed again. It is difficult to get the class of patients, who are by the way usually all village people, to undertake this subsequent treatment.

The votaries of the suprapubic operation, who state that stone cannot recur after this operation, whereas it is quite possible with litholapaxy, may have to consider one factor and that is that perhaps the inner scar in the bladder may be helping the deposit of gravel and the subsequent formation of a stone.—Yours, etc.,

J. F. HENRIQUES, L.M. & S., F.C.P.S., B.M.S.,
Civil Surgeon.

LARKANA (SIND),
24th October, 1931.

A CASE OF AINHUM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have rather an interesting case at the Alipuram Jail which I would like to bring to your notice; it is possibly a case of ainhum. The patient is a young Moplah convict, aged 34 years, who was admitted to hospital on the 10th of August 1931 complaining of a little pain in the fourth and little toes of both feet. On examination, the affected toes were found deeply grooved on the dorsal and side aspects, especially the little toes, and to make the description as short as possible, the condition is identical with the condition described as ainhum in books on tropical medicine, except that there is no involvement of the plantar surfaces which according to textbook descriptions is the first involved. The toes are not as yet connected by a fibrous cord, but the grooving seems to be a slow process and in accordance with the patient's statement is progressive. He states that the condition started two years ago. At present, according to the patient's statement, there is no pain and there is no tenderness when pressure is applied. The little toes are, however, becoming bulbous in appearance. He gives no history of syphilis and blood sent to Guindy for the Wassermann test was negative. As treatment, I have been painting the toes with 1—500 solution of acriflavine in absolute alcohol, and giving the patient anti-syphilitic remedies. He has had five injections of Neosalvarsan since he was admitted to hospital, but there is no apparent improvement. I am thinking of sending him to Madras to have the feet *x*-rayed as there is no *x*-ray apparatus in Bellary. This will probably give us information as to whether the bone is involved or not.—Yours, etc.,

H. T. INCE, L.M.S., S.A. (Lond.), I.M.D.,
Medical Officer, Alipuram Jail.

BELLARY,
7th October, 1931.

Service Notes.

APPOINTMENTS AND TRANSFERS.

LIEUTENANT-COLONEL A. H. PROCTOR, D.S.O., on return from leave *ex*-India, is re-appointed as Surgeon Superintendent, Presidency General Hospital, Calcutta, with effect from the 13th September, 1931.

Lieutenant-Colonel W. L. Harnett is confirmed in the post of Professor of Surgery, Medical College, Calcutta, and Surgeon to the College Hospital, with effect from the 28th June, 1930.

Lieutenant-Colonel A. F. Hamilton, C.I.E., to officiate as Superintendent, St. George's Hospital, Bombay, with effect from the 24th September, 1931.

Major W. C. Spackman to officiate as Professor of Midwifery and Gynæcology, Grant Medical College, and Superintendent, Bai Motlibai and Sir D. M. Petit Hospitals, Bombay, with effect from the 24th September, 1931.

Major J. Rodger, M.C., has been appointed substantively to be an Agency Surgeon in the Foreign and Political Department, with effect from the 2nd October, 1931.

The services of Major H. G. Alexander have been placed at the disposal of the Government of Bihar and Orissa, with effect from the 1st August, 1931.

LEAVE.

Brevet-Colonel H. H. Thorburn, C.I.E., Surgeon to H. E. the Viceroy, has been granted combined leave out of India for 6 months from the 15th September, 1931.

Major T. H. Thomas, Civil Surgeon, Bakarganj, is provisionally granted leave for 7 months, with effect from the 16th September, 1931.

Major R. V. Martin, officiating Inspector-General of Prisons, Bombay Presidency, is granted with effect from the 18th April, 1932, leave on average pay for 8 months followed by leave on half average pay for 4 months.

Major J. C. Pyper, O.B.E., has been appointed substantively to be an Agency Surgeon in the Foreign and Political Department, with effect from the 1st October, 1931.

PROMOTIONS.

Lieutenant-Colonel Sir Frank P. Connor, *Kt.*, D.S.O., has been promoted to the rank of Colonel, with effect from the 30th August, 1931, with seniority from the 3rd June, 1923.

Major J. H. Hislop, M.C., has been promoted to the rank of Lieutenant-Colonel, with effect from the 27th July, 1931.

The Lieutenants named below have been promoted to the rank of Captain, with effect from the dates noted against their names:—

V. E. M. Lee, 1st August, 1931.
G. B. W. Fisher, 2nd August, 1931.
E. P. N. M. Early, 6th August, 1931.
W. McAdam, 6th August, 1931.

Lieutenant H. S. Smithwick has been promoted to the rank of Captain (provl.) from the 1st September, 1931.

RETIREMENTS.

Colonel J. Fuller-Good, V.H.S. Dated 30th August, 1931.

Lieutenant-Colonel E. C. Hepper. Dated 1st September, 1931.

Lieutenant-Colonel A. G. Tresidder, C.I.E. Dated 29th August, 1931.

Lieutenant-Colonel W. Tarr. Dated 21st June, 1931.

Major R. R. M. Porter, M.C. Dated 1st August, 1931.

Notes.

LEWIS'S, 1884—1931.

THE well-known London firm of publishers and booksellers, H. K. Lewis and Co., have just issued an interesting little booklet, an illustrated account of the foundation and development of their excellent book "service". Lewis's have moved into a new and fine-looking building; the site on which the new premises are built includes, but overlaps, the site on which their shop has stood for many years. The new building will probably please the American who received one of the many shocks he must have received during his first visit to London, when, wandering down Gower Street, he encountered the unimposing building that housed the

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ous library from which he had received such efficient vice for many years. For our part we shall miss the l shop—with its many student-day associations. To e writer Gower-street underground station always meant—Lewis's, and incidentally "Euston and the North", but first of all—Lewis's; later, when the name of the underground station was changed to "Euston", he felt that it was a mistake and that it should have been called "Lewis's". We Londoners do not always associate old, unimposing buildings with lack of efficiency, and *vice versa* we are often suspicious of the new and imposing. In this case however we feel no misgivings. Increase of business necessitated extension of premises, and we know that it has not been extensive advertising, but good solid service, which has carried the name of Lewis's into the most distant parts of the earth. There has been no change of management and we feel satisfied that the old standards will be maintained and that Lewis's library, book-shop and publishing business will continue to give the best of service, and to flourish.

WATSON'S INSTRUMENTS.

An Automatic Diary.

THE precise pressure of the air at any moment of time is not so important as the fact that the pressure is rising or falling or steady. This is to be seen by a glance at the automatic record in Watson's barograph. This instrument is a barometer, a weather recorder, a weather prophet, and a watchman who tells us unmistakably when it is "Nine o' the clock and a fine night."

The barograph has a sensitive aneroid movement recording on a chart attached to a drum which revolves once in a week. The mechanism is perfectly finished in matt gilt and is enclosed in a case with oak or mahogany frame and bevelled glass sides and top. It is an altogether handsome instrument of the most accurate construction. The price, which includes a set of charts for one year, is £10 10*s*.

A. Pedometer.

It is so easy to misstate the distance one has walked. Without meaning to deceive, it is natural to overrate one's efforts. Why not avoid any deception and keep an accurate account of mileage? It is useful to do this *en route*, and adds interest to the last few miles at dusk.

Watson's pedometer is carried in the pocket, and records any distance walked up to 100 miles, registering miles and yards. It is useful to everyone who rambles, scouts, hikes, stalks, tramps, golfs or progresses on foot in any way. It is also useful in making rough surveys. Watsons sell their pedometer for £1.

These are obtainable from Messrs. W. Watson and Sons, Ltd., 313, High Holborn, London, W.C. 1, England.

THE "WATSON-SANKEY": PORTABLE *X*-RAY UNIT.

THE "Watson-Sankey" portable *x*-ray unit has been designed in collaboration with Dr. R. H. Sankey, of Oxford. A great deal of effort and careful research have been expended on its development. The apparatus is not merely a small, lightly-built equipment of rigid type, but a series of component parts which can be quickly assembled to form a complete unit yielding an output considerably larger than the majority of portable equipments and sufficient for all normal radiographic work. Each component is sufficiently small and light for easy transport, and fits comfortably into a dust-proof canvas case fitted with carrying handles.

The component parts are:—(1) A trolley base on which the rest of the apparatus is mounted; (2) a box type switchboard; (3) high-tension transformer, and (4) a tube stand.

These components can be assembled with such ease that it is possible to take a radiograph a few minutes after arrival in a ward or a private house. The apparatus can be operated on the ordinary power supply or, if necessary, on the lighting circuit.

High-tension transformer.—The transformer is of the standard Watson oil-immersed type, with special removable high-tension terminals for easy transport.

Output.—The output is 90 kV. peak at 10 mA. This is greater than that of the average portable equipment and sufficient for all normal radiography. This output is normally fixed, but by means of a special auto-transformer, supplied as an extra, it is possible to obtain a range of kilovoltage from 50/90.

Switchboard.—The switchboard carries a milliammeter connected in circuit at the neutral point of the transformer, a voltmeter suitably marked to ensure the supply of the correct voltage to the tube, two safety fuses, an adjustable control for selecting correct reading of voltmeter and a main switch. Arrangements are also made whereby various alternating current voltages may be used. All electrical connections are completely enclosed, so that there is no risk of shock to the operator.

Exposure switch.—An automatic exposure switch is connected to the switchboard by a length of flexible cable, so that the operator is allowed reasonable freedom of movement. It may be set for exposures of any length from ¼ to 12 seconds, by rotating a small knob. The exposure is started by pressing a button, and is terminated automatically.

Tube stand.—The tube stand is specially designed and is arranged for use with a Metalix tube. It allows of movement of the tube to any position for radiography, and has sufficient extension for work over either side of a normal bed. All movements can be locked. High-tension connections are made from the tube to the transformer by spring rheophores through insulators to the tube.

The cost of this set is £120. Further particulars can be obtained from Messrs. Watson and Sons (Electro-Medical), Ltd., Sunic House, Parker Street, Kingsway, London, W.C.2.

NEW TRENDS IN *X*-RAY TECHNIQUE.

THE doctor who specialises in radiology is largely dependent on the technical aids and appliances that industry can place at his service. The exhibition associated with the three-yearly international *x*-ray congresses is therefore of great importance to medical men. During the entire period of the congress recently held at Paris, radiologists from nearly all countries visited the exhibition in order to study the new constructions and the improvements that have been effected in existing types of apparatus, which they were able to compare at their leisure with critical eyes. At this exhibition many a doctor definitely purchased an apparatus that he had been considering for some time. The *x*-ray industry is fully aware of the significance of this exhibition for its sales in years to come and takes care to avail itself of this opportunity for demonstrating its latest types of apparatus to radiologists.

With few exceptions, the exhibition offered this time, as on previous occasions, a survey of what the whole world produces in the way of *x*-ray apparatus. A few German firms—not all—found it necessary on account of present economic conditions, to decline at the last moment to participate in the exhibition. That the American *x*-ray industry displayed its exhibits this time on a particularly generous scale, is evidence of its keen desire to capture a part of the European market. Holland was represented by Philips' Works, which have for years been doing pioneering work by manufacturing an *x*-ray tube (the "Metalix" tube) giving absolute protection against dangerous *x*-rays. The surrounding of an *x*-ray tube with unwidely protective devices, consisting of shields made of lead and other materials impervious to *x*-rays, has now become a thing of the past, as practically all other manufacturers of *x*-ray apparatus are now following suit and embodying the

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x-ray protection in the tube itself. This new development in x-ray technique, which has taken place within a few years, has greatly facilitated the work of those who prepare and administer the x-ray laws in the various countries.

By bringing out the "Metalix-Portable" apparatus, Philips' demonstrated a new way of obtaining maximum safety in radiology, for this apparatus also gave full protection against high tension, it being quite safe to touch any part of the apparatus during operation on a tension as high as 45,000 volts. This time, however, Philips' Works have gone a step further and have devised the complete protection against x-rays and high tension in such a manner as to be proof against the very highest tensions that may occur.

A high-tension protected tube for deep therapy, requiring a tension as high as 180 kV, aroused widespread attention. The small space occupied by the entire x-ray apparatus, including a stand that is adjustable in all directions and a completely-iron-clad high-tension generator, is in itself a factor of greatest importance, apart from the complete protection. As a rule, installations for deep therapy, with separate conductors for high tension, take up a very considerable amount of space, which is not always available.

As a result of the above-mentioned improvement the plant for deep therapy assumes the character of a high-tension laboratory, and this simplification will have a reassuring and agreeable effect on the patient.

These high-tension protected tubes, complete with transformer and with insulated and earthed flexible cables, can easily be mounted on any type of stand. The entire x-ray plant is thus simplified to such an extent that one need be no expert in order to foretell that this example, too, will speedily be followed by other firms. This will undoubtedly be proved by the next exhibition, which is to take place together with the 1934 congress at Zurich.

Finally, we would also mention the "Rotalix" apparatus, which is intended for taking snapshots of the heart and lungs. In its construction as well as in its manner of operation, this apparatus differs from all other types of x-ray apparatus exhibited by the international x-ray industry. When contemplating the x-ray table, at which the patient, the tube and screen can be moved in all sorts of ways in every conceivable direction, one would hardly imagine it possible to bring out anything new in this line. However, this has nevertheless proved possible in the case of the "Rotalix" apparatus. The simplicity of adjustment and the almost automatic manipulation of this apparatus are factors which have aroused great admiration and surprise, especially in America. With this apparatus a large number of lung radiograms of excellent quality can be taken in a short time.

Simplified aids and appliances for the use of the radiologist, increased safety and improved sharpness of detail in the radiograms, are features that have opened up new avenues to x-ray practice as well as to scientific research in this domain.

ACRIFLAVINE.

ACRIFLAVINE "B. D." was the first brand of British acriflavine used as an antiseptic wound dressing—it was introduced in 1916, and by virtue of its bactericidal power and freedom from toxicity under all practical conditions, it still maintains its supreme position. Further, those exceptional properties which led to its adoption as an antiseptic dressing for wounds have since proved of value also in routine practice in a variety of other conditions in which antiseptic treatment is indicated as, for example, in ulcers of the leg, carbuncles, cellulitis, osteomyelitis, acute suppuration, abscesses, and anal fistula. More recently its use has been extended still further.

It would appear (*Lancet*, 1931, 1, 323) that members of the medical profession appreciate the importance of using only a brand of acriflavine which has been made by manufacturers who "specialise" in its production—Acriflavine "B. D." is manufactured by British Drug Houses Corporation and prepared for medical use by The British Drug Houses, London, England.

The following are a few extracts from reports on the value of Acriflavine in conditions of common occurrence in general practice—

In septic conditions.—" ..... I have come to regard acriflavine as one of the safest and as near the ideal antiseptic as at present obtainable." (*Lancet*, 19[illegible] 1, 323.)

" ..... acriflavine is an antiseptic which has the property of exerting bacteriostatic action in enormous dilutions'—very much greater than that of any other commonly used antiseptic." (*B. M. J.*, 1931, 1, 68[illegible])

In gonorrhœa.—" ..... intravenous injections of acriflavine and neutral acriflavine are very successful in the treatment of acute gonorrhœa and prevent the development of complications, while in chronic gonorrhœa, either alone or supplemented by irrigation, obstinate infections of many years' standing are cured." (Abstr., *Brit. Journ. Urol.*, Dec., 1930.)

In impetigo.—" ..... spoke with approval of the use of acriflavine for these cases; it had given, in his hands, better results than silver nitrate." (*Lancet*, 1931, 1, 473.)

In psoriasis vulgaris.—" ..... 20 cases of psoriasis vulgaris treated with intravenous injections of acriflavine ..... All but 3 of the cases showed clinical improvement; in 4 the results were striking." (Abstr., *B. M. J.*, 1931, 1, 14.)

In midwifery.—" ..... I have made a regular habit of treating immediately all cases in which the perineum has been torn, no matter how small or large the tear, with a dressing of acriflavine in glycerin (1 in 500) and I am pleased to say I have had remarkably good results, the cases showing little or no sepsis, and healing up quite well and quickly." (*B. M. J.*, 1931, 1, 294.)

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